

# ROADS *and* STREET

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

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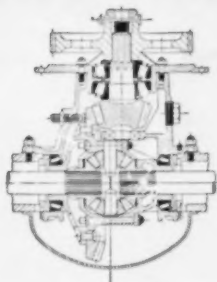
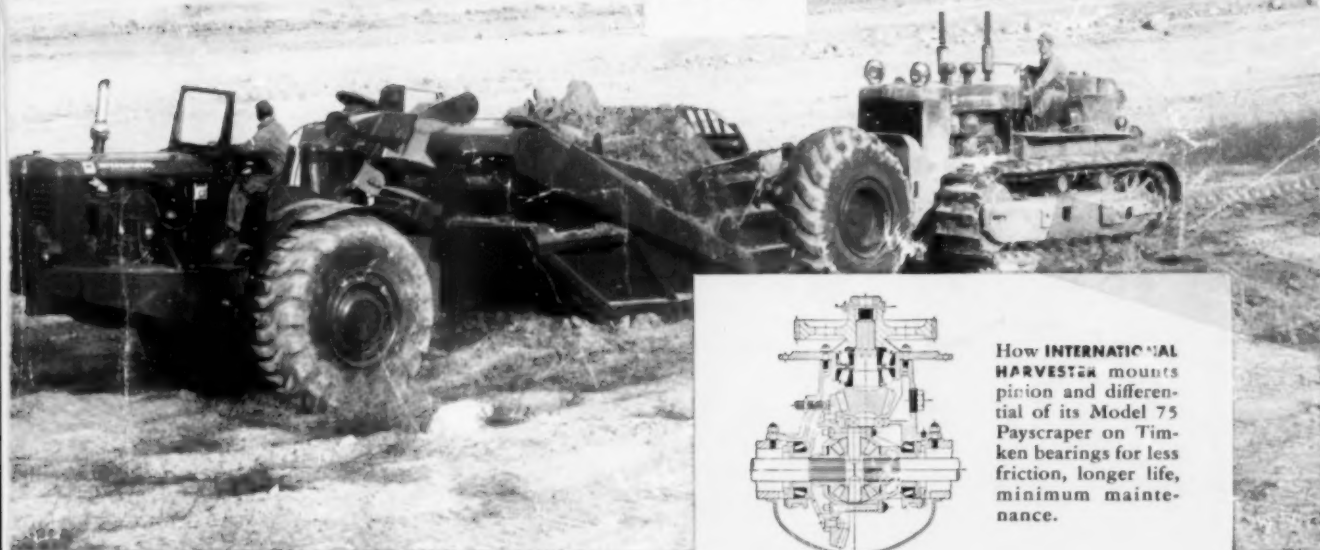
Contractors Dig in On

## Giant Cut

NEW LOOK AT BITUMINOUS  
SOIL STABILIZATION

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Accepted as Controlled Circulation  
Publication at Cedar Rapids, Iowa



How INTERNATIONAL HARVESTER mounts pinion and differential of its Model 75 Payscraper on Timken bearings for less friction, longer life, minimum maintenance.

## Travels 24 mph cross-country with 20 cubic yard payload...TIMKEN® bearings keep it rolling

THIS is International Harvester's Model 75 Payscraper. It can travel cross-country at 24 MPH with a 20 cubic yard payload. One of the ways International Harvester assures long life in spite of the most difficult jobs is by mounting vital parts on Timken® tapered roller bearings.

In the tractor's differential and on its pinion shaft and engine shaft, Timken bearings insure accurate gear meshing. That's because the tapered design of Timken bearings lets them take radial and thrust loads in any combination. Shaft alignment

is insured. There's always a smooth flow of power.

Full line contact between rollers and races of Timken bearings provides the extra load-carrying capacity they need to handle extra-heavy loads. And because Timken bearings keep housings and shafts concentric, they make closures more effective. Lubricant stays in—dirt stays out.

Timken bearings also keep maintenance low. One reason: they're designed by geometrical law to have true rolling motion and made with extreme accuracy to provide the low

friction this design makes possible. To insure the highest quality steel, we make our own. We're America's only bearing maker that does.

Make sure the equipment you buy or build has Timken bearings. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.

**TIMKEN**  
TRADE-MARK REG. U. S. PAT. OFF.  
**TAPERED ROLLER BEARINGS**



NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER   
BEARING TAKES RADIAL AND THRUST —LOADS OR ANY COMBINATION

# Puts Teeth in the Bite

## Chrysler Power-plus Combination provides extra work capacity at little extra cost

Here's a smart contractor. He's picked a ¾-yard trencher powered and propelled by a Chrysler Industrial Engine. Specifically, it's the Chrysler Ind. 56 Engine — 331 cubic inch displacement *over-square* short stroke V-8 — most efficient industrial V-8 built.

Behind, mounted integrally to the engine and connected to the worm shaft by a flexible coupling, is the Chrysler Industrial Torque Converter. This is the lightweight torque converter — two-thirds the weight of other makes — with dual cooling and its own self-contained oil sump and oil pressure system.

This combination — Chrysler Industrial V-8 Power and Chrysler Industrial Torque Converter — gives the Unit 1020 heavy-duty workhorse power *plus*. **PLUS** 2.6 torque multiplication to fill any intermittent need for extra power on extra-tough jobs. What's more, with this Chrysler combination, there's no lessening of engine efficiency because, as torque demand falls off the converter automatically enters coupling range, reaching 97% efficiency.

It's not surprising that Unit Crane offers the Chrysler combination as standard equipment on almost its entire line, from ½ to ¾ yard machines. It's the kind of power their customers want.

It's the kind of power your customers want, too. From 230 to 331 cubic inch displacement, in-line 6 or V-8, there's a Chrysler Industrial Engine to fit your equipment. *They cost no more than the best of the rest, but what a powerful lot of difference!* See a Chrysler Industrial Engine Dealer, or write:

Dept. 105, Industrial Engine Division,  
Chrysler Corporation, Trenton, Michigan.

Chrysler Ind. 56 V-8 Engine  
— 331 cubic inch displacement

PHOTO COURTESY UNIT CRANE & SHOVEL CORP., MILWAUKEE, WISCONSIN

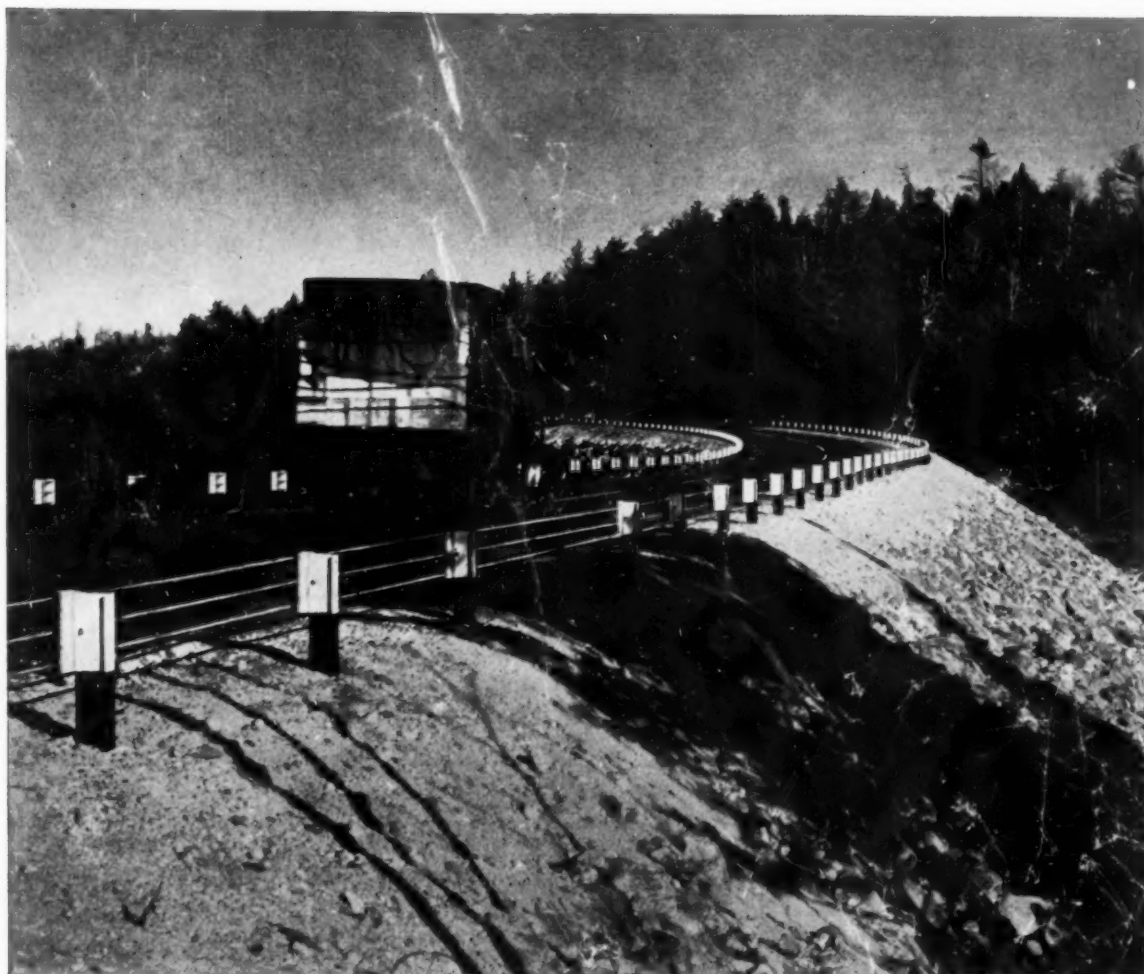
# CHRYSLER

## INDUSTRIAL ENGINES

HORSEPOWER WITH A PEDIGREE



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## Protect Highway Danger Spots With Bethlehem Cable Guard Rail

Used at sharp turns, embankments, bridge approaches and other danger spots along the highway, Bethlehem Cable Guard Rail forms a strong, effective barrier, with high resiliency and impact-absorbing qualities.

You can be sure of dependable protection for motorists when you install Bethlehem Cable Guard Rail. For this strong steel highway guard is designed to meet the demands of modern traffic, with its heavier volume and higher speeds.

Bethlehem Cable Guard Rail, with its special bumper-type bracket, is simple in design, easy to install, and low in cost. It requires little maintenance, can be used with either steel, wood or concrete posts, and is furnished to comply with any state regulations. It comes with 2, 3 or 4 cables, and with 1-, 1¼- or 1½-in. anchor rods. Bethlehem furnishes cable guard rail, together with steel posts, brackets, cable ends, anchor rods, cable splicers and fittings, all

of which assemble readily on the job.

If you would like to have more information about Bethlehem Cable Guard Rail or the solid-beam type of guard rail which we also make, just call the nearest Bethlehem sales office, or write to us at Bethlehem, Pa.

**BETHLEHEM STEEL COMPANY**  
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by  
Bethlehem Pacific Coast Steel Corporation  
Export Distributor: Bethlehem Steel Export Corporation

# BETHLEHEM STEEL



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**ROADS AND STREETS, May, 1956**

# ROADS AND STREETS

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VOLUME 99

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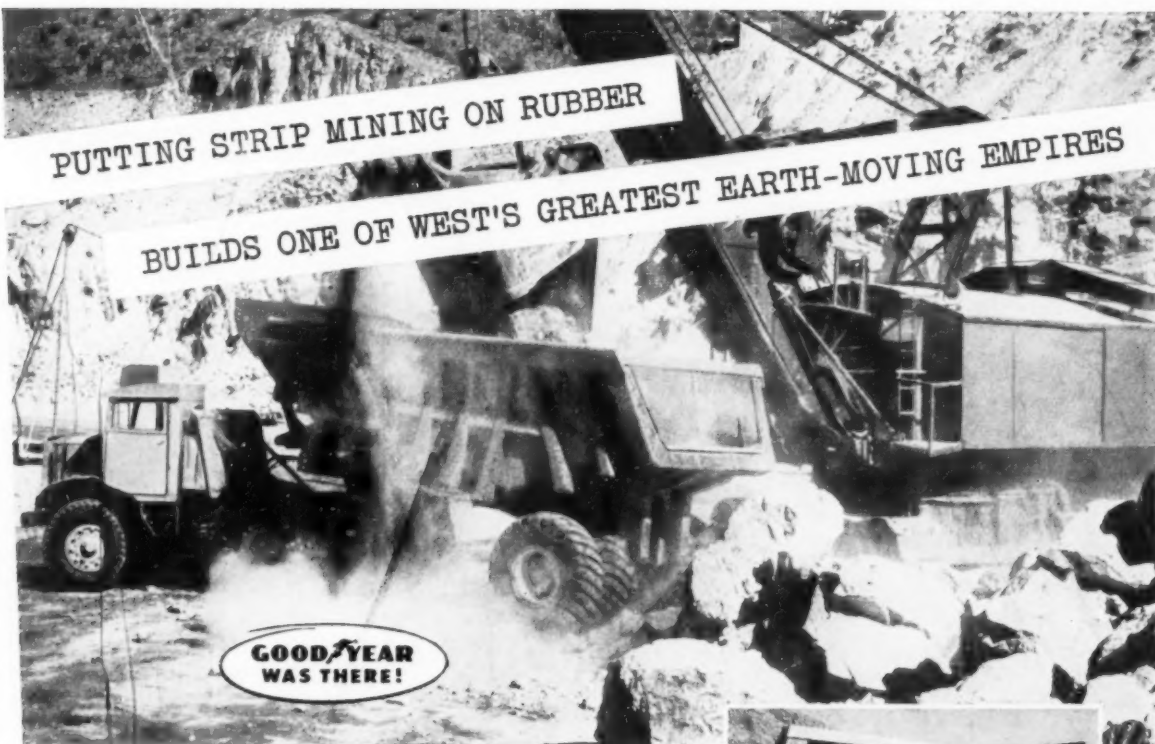
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PUTTING STRIP MINING ON RUBBER

BUILDS ONE OF WEST'S GREATEST EARTH-MOVING EMPIRES

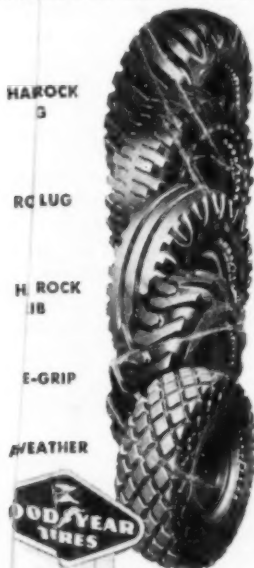


When the Isbell Construction Company was still a fledgling earth-moving outfit, strip mining was done on rails. By proving the greater speed and economy of rubber-tire equipment, Isbell became one of the country's leading mine strippers. In the last years, Isbell has moved over a quarter-BILLION tons of ore and waste — has built more than 1,000 miles of roads—now owns a multimillion-dollar array of mining and road-building equipment—and is still rolling ahead in operations from Canada to Mexico! Tires in this picture are Goodyear's famous Hard Rock Lug.



TRUCKS AND TIRES ARE WASHED DOWN DAILY—parts, treads and sidewalls are carefully inspected. Expert tire care pays off big.

NOW! 3-T NYLON CORD—CONVENTIONAL OR TUBELESS!



is a Goodyear dealer  
near you. Ask him for  
better tire wear—better tire care.

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ROADS AND STREETS, May, 1956

## Another great Goodyear FIRST ends tube and flap troubles FOREVER!

Now—no matter how big your equipment—you can buy and specify Goodyear off-road and earth-moving tires in TUBELESS!

They're practical—they're proved—they're cost-cutters—the tire, rim and trucking industries have adopted Goodyear's "Smallest-to-Largest" program —leading equipment manufacturers have adopted Goodyear tubeless tires and rims as standard or will supply them as specified—and you can switch RIGHT NOW, quickly and economically!

Your potential savings can obsolete all previous ton-cost figures. Get the glad facts direct—from your Goodyear dealer. Goodyear, Truck Tire Dept., Akron 16, Ohio.

Buy and  
Specify

# GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Road Lug, All-Weather, Sure-Grip—T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio



## Saves 6 men, 4 tampers, 2 compressors and small dozer with one-man-operated "80-W"

VAN DOREN BROTHERS of Richmond, Virginia recently backfilled and compacted approximately two miles of trench, 2 feet wide and 4 feet deep, for a 6-inch gas line with just one man and one machine, a Cleveland "80-W" backfiller.

Before the Van Dorens purchased their "80-W" they used 7 men, a rubber-tired dozer, 2 compressors and 4 air-driven tampers for backfilling and compacting on jobs of similar size and type. The one-man-operated "80-W" did the complete job in less time than the 7-man crew formerly required on comparable jobs. "It's a great time saver," was F. M. Van Doren's comment on its performance.

On a previous job their Cleveland backfiller had saved them considerable time and money on a 12-inch water line trench, averaging approx-

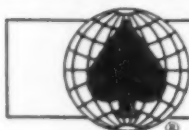
imately 6 feet deep, by its unique ability to backfill spoil deposited on a down slope on the far side of the trench, while simultaneously tamping it to the state of Virginia's rigid compaction specifications.

The "80-W" also does an outstanding job of side-crane work, lays pipe, pulls crossings, sets hydrants and valves, pulls sheathing, loads and unloads pipe, etc. Despite its ability to perform all these operations—and do an outstanding job on each of them—the "80-W" is easy to operate. The Van Dorens' operator learned to operate it with high efficiency after only two days training on the job.

Investigate this remarkable time, labor and machinery saving tool now—so that you, too, can realize its outstanding benefits on your next job.

See your local distributor for the full Cleveland story or write direct to:

**THE CLEVELAND TRENCHER COMPANY • 20100 St. Clair Ave., Cleveland 17, Ohio**



# CLEVELAND

... for more details circle 201, page 16

## ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 63 years of continuous publishing in the highway field; combined with Engineering and Contracting and Good Roads Magazines, established in 1892.

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World Construction (International)  
Construcción Pesada (Latin)

# THE JOB: straighten a road, build bridge approaches **AND MOVE A RIVER!**



This CAT\* No. 12 Motor Grader is helping cut out a new channel for the Iowa River near Marshalltown.

It's part of a project which called for straightening curves in a county road, building approaches to a bridge, and diverting a meandering river beneath its new span. The length of road involved was only 0.8 of a mile, but Mickle and Ross Construction Co., of Newton, Iowa, moved nearly 100,000 cu. yd. of dirt.

Foreman Virgil E. Reynolds had a fleet of 11 Caterpillar machines on the job. "We don't have an off-breed in the outfit," he said.

Working close to water like this is tough going. The No. 12 had to maneuver in mushy, sandy loam. "Occasionally machines hit silt pockets and nearly dropped out of sight," Supt. Reynolds said, "but I never worry when I've got the right equipment... and I've got the right equipment."

The No. 12 is "the right equipment" for contractors all over the country—for four big reasons. Costs less

to maintain. Costs less to operate. Produces more. Lasts longer.

Your dealer would like a chance to back up each one of these claims with specific details. The exclusive Caterpillar oil clutch, for instance, that gives up to 1500 hours' service without adjustment. And the new tubeless tires (now standard equipment) that can eliminate 80% of the down time caused by tires.

Let your Caterpillar Dealer demonstrate the dozens of other features that make the No. 12 the high-producing, cost-cutting motor grader it is.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

## CATERPILLAR\*

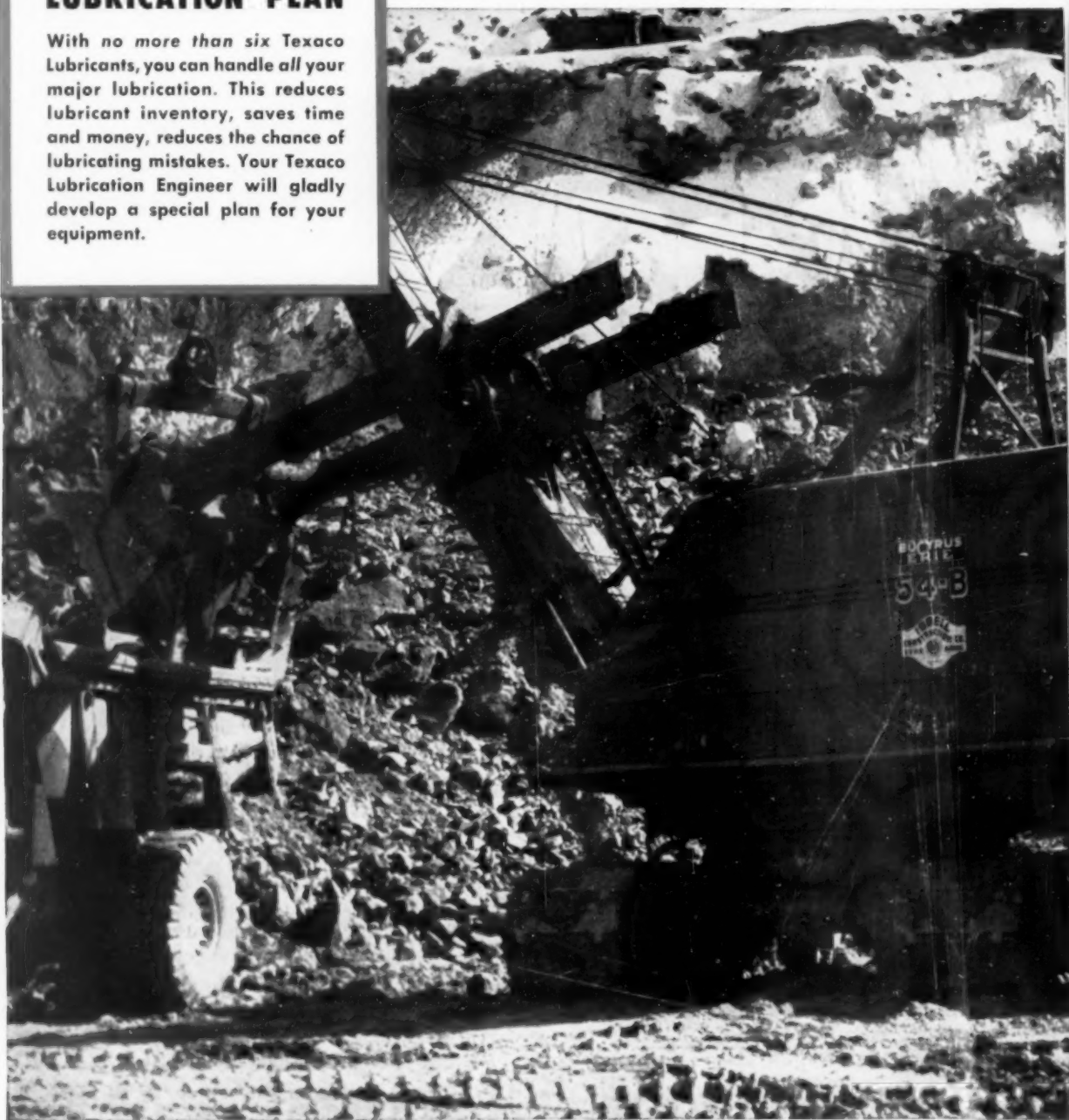
\*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**99% OF ALL CAT MOTOR  
GRADERS EVER BUILT  
ARE STILL ON THE JOB**

## TEXACO SIMPLIFIED LUBRICATION PLAN

With no more than six Texaco Lubricants, you can handle all your major lubrication. This reduces lubricant inventory, saves time and money, reduces the chance of lubricating mistakes. Your Texaco Lubrication Engineer will gladly develop a special plan for your equipment.

# Get FULL



TUNE IN:  
TEXACO STAR THEATER  
starring  
JIMMY DURANTE  
on television . . .  
Saturday nights, NBC.



# TEXACO

# POWER

# from your engines



**CONTRACTORS** who lubricate with the *Texaco Ursa Oil* recommended for their engines get the clean performance that means *more power with less fuel and fewer overhauls*... dependable, trouble-free operation and lower maintenance costs.

There is a complete line of *Texaco Ursa Oils* to meet the needs of all diesel and heavy duty gasoline engines. These famous oils protect against wear and corrosion, prevent harmful engine deposits, keep rings free and ports clear for proper compression and combustion.

For your air compressors, *Texaco Regal Oil R&O* assures dependable, clean operation... freedom from harmful deposits and rust.

For your rock drills, *Texaco Rock Drill Lubricant EP* gives you longer drill life and protection against rust whether drills are running or idle.

Let a Texaco Lubrication Engineer explain how effective lubrication helps keep jobs on schedule and maintenance costs low. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York.

## Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

# All-round Dirt-Moving Team

## for low-cost operation



**LARGE ENOUGH to get jobs done fast—  
SMALL ENOUGH for profitable use on low-yardage jobs**

**HD-11 crawler—75 drawbar hp.** Gets more work done faster and at lower cost with these on-the-job advantages; shock-absorbing, all-steel, box-A main frame; rugged final drives that ride on straddle-mounted roller bearings; 1,000-hour lubrication intervals for truck wheels, idlers and support rollers; ceramic-lined master clutch that requires fewer adjustments, provides extra long life; plus new operator convenience that includes a big foam rubber seat and 24-volt direct electric starting.

**AC-106 scraper—6.1 yd struck, 7.5 yd heaped.** Plenty of features for fast, low-cost dirt moving: curved, offset cutting edge and “center-boiling”

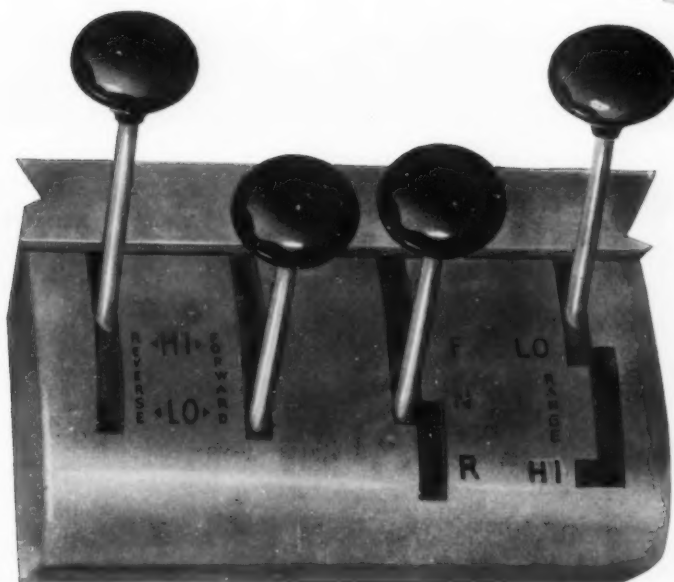
loading action; wide, low bowl to keep center of gravity low; high-flotation tires and ample ground clearance; maximum stability for working on slopes or rough terrain; 81-in. apron opening and forward-forced ejection for quick, clean dumping; easy adjustments; simple sheave system.

See these and other important earth-moving advantages of Allis-Chalmers crawler tractor and scraper combinations at your Allis-Chalmers construction machinery dealer. He has complete facilities to serve you—factory-trained servicemen, factory-approved methods and complete stocks of True Original Parts.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

# ALLIS-CHALMERS





## Without clutch these controls\* shift Huber-Warco Motor Graders

Combination of a torque converter and power-shift transmission on Huber-Warco motor graders, permits quick, effortless shifts under full load, **WITHOUT CLUTCH**. Efficiency is increased, operator fatigue is reduced, thereby making possible greater workload capacity.

\* 6D and 7D motor grader shifting pattern.

For a demonstration—see your nearest Huber-Warco distributor



### HUBER-WARCO COMPANY

MARION, OHIO, U. S. A.

*Road Machinery*

CABLE ADDRESS: HUBARCO

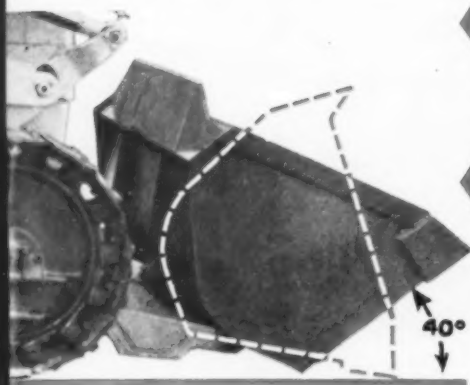
ROAD ROLLERS • MOTOR GRADERS • MAINTAINERS • GRINDERS

... for more details circle 222, page 16

ROADS AND STREETS, May, 1956

**AMAZING!...NEW!...**

# Rear-engine 1 $\frac{3}{4}$ yard



**PRY-OUT BUCKET ACTION:** Tremendous 17,500-lb pry-out force is obtained by using break-out pads on ground as fulcrum for leverage. This transfers load forces to ground instead of to machine.

**40° BUCKET TIP-BACK AT GROUND LEVEL** permits digging of bigger bucket loads, *plus* retaining of more of load in bucket during lifting and carrying.

**OPERATOR SITS COMFORTABLY** in foam-rubber seat, handles conveniently-placed, power-assisted controls, can see load and cutting edge at all times.



# International® Payloader®

- New—this highly-maneuverable crawler tractor-loader with "power-shift" transmission teamed with Torque-Converter advantages—to give you maximum possible material-moving capacity and speed in any given condition.

- Operator sits up front, close to bucket, can always see what he's loading, where he's going.

- Speed unmatched in crawler history, 10 mph forward, 13 mph reverse, provides faster cycles.



If it's *speed* and *maneuverability* and *big capacity* you want in a crawler-loader, see the new International 1¾ yard Model 12 Payloader!

This amazing new 91½ hp loader seats its operator *in front of the engine*, up close to the bucket, where he has an unobstructed view of everything from cutting edge to toe of bank. It balances the tractor between rear-mounted engine and front-mounted bucket. Weight is evenly distributed over entire length of tracks. You get better traction, longer track life, better stability on grades, less bogging down in spongy ground.

Your operator moves faster on this new Payloader, too. He can go up to 10 mph forward, 13 mph in reverse. He changes speeds or direction instantly through a full-power shift, three-speed transmission. No waiting, no stopping, ever! *All* shifts through *all* speeds can be made in either forward or reverse under full engine speed **WITHOUT SLOWING DOWN**. Torque-converter gives you maximum digging-power for the toughest jobs. (Operation gets *another* boost from the torque converter . . . it provides an infinite range of speeds, automatically selecting the one which best balances load and torque.) Steering is a finger-tip cinch, too, because each *steering clutch* and *brake* is controlled by one power-boosted lever *only* (no foot steering brakes).

Try this new International Model 12 Payloader for yourself. Your International Industrial Power Distributor will be glad to demonstrate. Call him soon! A good deal awaits you!



## International Industrial Power

130 N. MICHIGAN AVENUE—CHICAGO 80, ILLINOIS

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Tractor and Rubber-Tired Loaders . . . Diesel and Carbureted Engines



**Your profit is  
in his hands!**

Coming down to cases, your paver operator carries *your* profit in his hands. Because if he can keep the paver going at top speed all day long, he sets the pace for the entire paving crew—can save you money!

Doesn't it make sense then to make it possible for him to keep up that "top speed" operation? Doesn't it make more sense to put a Rex Paver in his hands...and your profit, too? For only Rex has Hydrocycle Control—the hydraulic brain that controls the entire batch cycle.

Hydrocycle cuts operator fatigue. He never has

to leave his seat. He stays as alert at the end of the day as at the start. He can devote his time to the other functions—traveling the bucket, swinging the boom, spreading the batch and traveling the paver. Hydrocycle plus a "fresh" operator adds up to more yards placed on the subgrade every day... more profit for you.

For all the facts on Hydrocycle and the many other job-speeding, cost-saving Rex Paver features, see your local Rex Distributor or write CHAIN Belt Company, 4652 West Greenfield Avenue, Milwaukee 1, Wisconsin.



**CHAIN BELT COMPANY**

... for more details circle 198, page 16

# **RUGGED D8S** **'DOZE ROCK** *on road to* *Donnells Dam*



In rough mountain country above Strawberry, California, Tri-Dam Constructors are preparing for the \$32,000,000 job of building Donnells Dam.

One of the first requirements is an 8-mile, 24-foot contour road leading up to the dam site and permanent camp. And most of the roadway has to be blasted out of steep granite slopes like the one pictured. Handling shot rock on locations like this takes tough equipment. That's why Tri-Dam is using CAT\* D8 Tractors with No. 8S Bulldozers. There are 9 of them working on the project.

The D8 has been known as "king of the crawlers" for years. As jobs grew bigger and tougher, the tractor has grown with them. Today's D8 is new from the ground up—bigger, tougher, more powerful than any earlier model. Look at these features:

- New heavy-duty 4-cycle diesel engine delivering 191 HP at 1200 RPM.
- Choice of torque converter or direct drive.

- Oil clutch, for smooth performance and long work life.
- New 7-roller track frame and long-wearing "water quenched" track shoes.
- New, more powerful starting engine with "in-seat" starting.
- Better job visibility and greater operator comfort.

Your Caterpillar Dealer will be glad to show you how this new D8 can increase your production. And you can depend on him for prompt service and original parts. Ask him for a demonstration today.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

## **CATERPILLAR\***

\*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**NAME THE DATE...  
YOUR DEALER  
WILL DEMONSTRATE**

# WHAT'S NEW in Equipment and Materials

## Low Cost Marker Has Automotive Steering

A completely new model, self-propelled line marker, featuring either solid or intermittent lines and automotive steering, has been announced by the M-B Corporation, New Holstein, Wis.

The new M-B LineMaster incorporates a number of features that have previously been found only in larger, higher priced models. Among these features is automotive type steering, which makes the ruggedly constructed, 3-wheeled LineMaster extremely maneuverable and eliminates the necessity of skid-steering for a perfect curve.

It is one-man operated and travels at a speed of from three to five miles per hour. A sturdy riding platform is provided where the operator is always in line with the paint guns and stripes to make retracing easier.

The LineMaster is equipped with an 18-gal. paint tank with a full opening top, designed for cutting cleanup time. Paint guns are standard, air operated and easily visible to the operator while marking.

For more information circle 101 on Service Coupon this page and mail now.

## Electric Drill Uses Diamond Bits

A new light and portable electric drill, announced by Pennsylvania Drilling Co., 1205 Chartiers Ave., Pittsburgh 20, Pa., uses diamond bits for drilling holes in or extracting test cores from concrete structures or highways, runways, etc.

Model "E" drills clean, smooth holes  $\frac{1}{2}$  to 6 in. in diameter, either vertically, horizontally or at any angle, through concrete walls and floors, reinforced concrete, marble, granite, tile, glass and brick. Drilling speed averages 1 in. to 3 in. per minute depending upon the degree of hardness of material, and the amount of steel encountered.

For more information circle 102 on Service Coupon this page and mail now.

## Hydraulic Coupling Provides Overload Protection

Overload protection, high power factor, and smooth positive acceleration are features claimed for the new Red Seal hydraulic coupling announced by Continental Motors Corp., 205 Market St., Muskegon, Mich. The new coupling is designed to transmit horsepower and torque through a fluid, thereby improving performance characteristics and cushioning both engine and equipment from shocks of sudden load applications. The new unit was developed for use on compressors, conveyors, blowers, cranes, crushers, pumps, winches, road equipment and other industrial applications.

For more information circle 103 on Service Coupon this page and mail now.

## 100-Ton Capacity Low-Bed Trailer

A new 100-ton capacity Model TDW-100-RC low-bed trailer, announced by Talbert Trailers, Inc., 7950 West 74th

St., Lyons, Ill., is stated to provide quick, easy, safe over-the-front-end or over-the-rear-end loading by means of Talbert's patented removable gooseneck and removable rear axle assembly. Construction of the rear axle assembly features full width solid bar axles and massive, cast steel walking beams. Standard specifications call for a deck length of 24 ft., but additional deck length is available on special order. The deck design illustrated shows drop-side construction which provides a minimum deck height. The addition of a simple wedge device permits road clearance length of 45 ft. 7 in. and over-all width is 11 ft. Tire size is 16.00x-25-20 ply.

For more information circle 104 on Service Coupon this page and mail now.

## Two New Wagon Drills

Two new air-driven wagon drills, featuring fully automatic controls grouped conveniently on a motor which can be repositioned along the mast, have been announced by the Thor Power Tool Co., Aurora, Ill. They are the SW-1, a general purpose model, and the BW-2, a heavy-duty unit.

The SW-1 "baby" wagon drill is a radically designed and compact unit which was field-tested for a year before production began. Mounting either a Thor 75 or 77 sinker rock drill or a Thor 82 or 92 drifter, the new rig is stated to produce exceptionally high drill-

## More equipment news page 144

## MAIL THIS COUPON TODAY!

**ROADS & STREETS**  
22 West Maple Street  
Chicago 10, Illinois

**CIRCLE THE NUMBERS AND MAIL NOW!**

Please send me further information on products and materials mentioned in the May Roads & Streets as circled below

### About New Equipment and Literature:

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 |
| 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 |
| 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 |
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### Further Information on Advertised Products:

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
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Name \_\_\_\_\_ Title \_\_\_\_\_

Firm or Gov't. Dept. \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ 5-56

NOT GOOD AFTER JUNE 15, 1954

ing speed and to have marked hole cleaning capacity. It is equipped with a saddle and cone permitting mast adjustment for drilling holes through a full 360° in all directions. The chassis "collapses," by means of a worm drive, for drilling at various levels down to extremely low positions for snake or lifter holes.

An outstanding feature claimed for the SW-1 is an unique design of the chain-drive mast permitting complete reversal and consequently longer wear. The newly engineered mast is also to be made available as a separate unit for supporting and feeding rock drills on the Thor rail-mounted "jumbo" car for underground mining and tunneling operations.

The BW-2 heavy-duty wagon drill has been extensively redesigned and improved to replace the BW-1 unit which Thor introduced in 1948. Built around the company's Model 105 drifter, the new rig incorporates a freshly designed mast with improved chain tension adjustments and advanced shock absorbers to harness power output of the 4 in. bore drifter.

For more information circle 105 on Service Coupon this page and mail now.

For more items . . . see page 144

## A READER SERVICE FOR YOUR NEEDS



## **SAVES ENGINES!**

Use Sinclair SUPER TENOL® to save your Diesels from the harmful and costly effects of *severe* operating conditions. Sinclair SUPER TENOL is specially engineered for the tougher jobs! It saves engines by combating the effects of high temperature, over-loading, and continuous stop-and-go service. It helps eliminate deposits of varnish, carbon and sludge that impair engine efficiency. Experience shows that Sinclair SUPER TENOL keeps equipment on the job longer . . . with less wear and fewer repairs!

Refill now with Sinclair SUPER TENOL. Contact your local Sinclair Representative or write Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y. *There's no obligation.*

**SINCLAIR** SUPER TENOL MOTOR OIL

. . . for more details circle 251, page 16

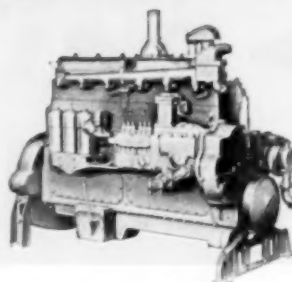
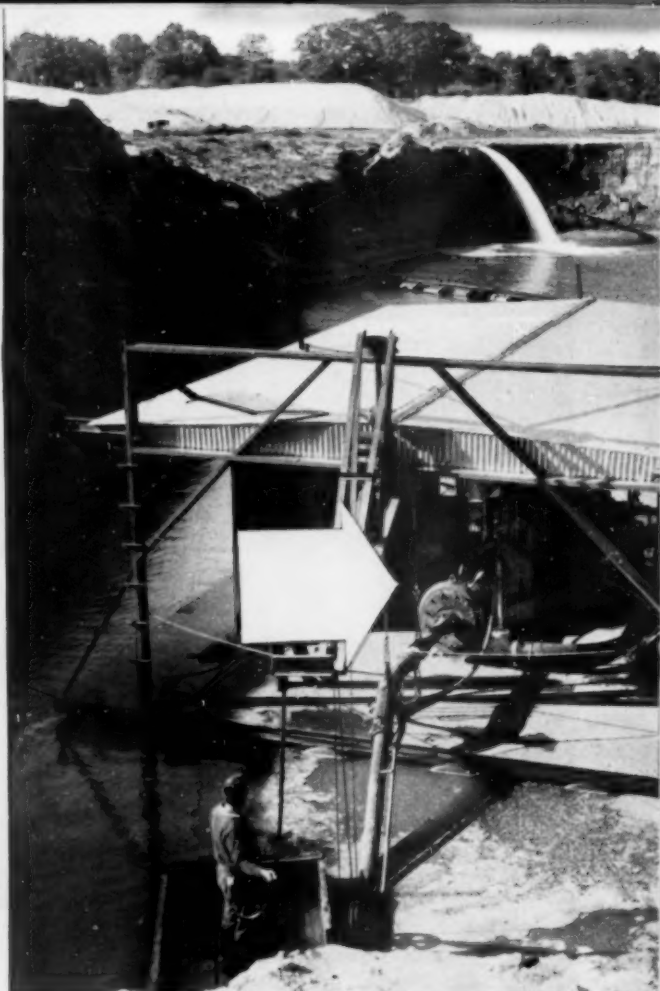
**ROADS AND STREETS, May, 1956**

## PROOF OF PERFORMANCE!

After 8 years' experience with a D13000, "nothing but another Caterpillar Engine" was considered by the Wenonah Sand & Gravel Co. for its second dredge

This CAT\* D13000 Engine drives a 6" pump in a hydraulic sand dredge, operated by the Wenonah Sand & Gravel Co., Wenonah, N. J. There's a 70-foot lift through 600 feet of pipe to the wash tower. The engine, purchased several years ago, is the company's second D13000. According to Earl T. Kroll, Chief Mechanic, here's why: "Having used a duplicate of this engine in another dredge since 1946 with unquestioned economy and reliability, when we wanted to put another dredge into service, there was nothing but another Caterpillar Engine for us, a choice we haven't regretted."

This is just one of thousands of cases where the performance of one Caterpillar Diesel has sold another. There's a reason. These rugged units, available up to 650 HP (maximum), pay off in dollars and cents *on the job*. Simple to operate, they need a minimum of attention and maintenance. And they're sturdily built for a long life of low-cost use in *every* type of construction equipment. What's more, your Caterpillar Dealer stands back of them with prompt, capable service whenever and wherever it's needed!



**NOW IN THE CAT  
POWER LINE-UP:  
THE NEW D342,  
AN EVEN MORE  
EFFICIENT UNIT!**

Replacing the D13000, the more powerful, more compact 6-cylinder D342 delivers 210 HP (maximum). And with Caterpillar 4-cycle design, the fuel system requires no adjustment and there are no air boxes or cylinder ports to clean. Your maintenance is reduced to a few minutes a month for oil and filter changes. For complete information about this and other modern heavy-duty engines, see your Caterpillar Dealer.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

# CATERPILLAR\*

\*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**MODERN HEAVY-DUTY  
DIESEL POWER**

## ROADS AND STREETS

Sixty-Four Years of Editorial Leadership

# Washington News Letter



By Duane L. Cronk

May 10, 1956

By a rousing vote of 388 to 19, the House of Representatives last month stamped its approval on a \$51.8 billion national roadbuilding program and a pay-as-you-go financing plan to underwrite it, the grandest internal improvement project in American history.

Both Democrats and Republicans climbed aboard the bandwagon to tout a gigantic roadbuilding program designed to ease the motorist out of what has become a stifling traffic jam. Heart of the two-part legislative package the House OK'd is:

- Authorization of \$37.6 billion in federal aid, which, matched by \$14.3 billion from the states, will spark an over-all roadbuilding market of at least \$8 billion annually for the next 13 years.
- Approval of new and increased taxes on motorists and truckers which, over a 16-year period, will bring in more than enough to finance the federal share of the big program.

\* \* \*

The unsavory political aura that has hung over the bill since it was first introduced by Congressman Fallon in January cleared away amazingly fast as "good-roads" advocates on both sides of the aisle came to their feet in praise of the measure all throughout the two days of debate. A number of very controversial provisions which the Roads Subcommittee had sought in vain to eliminate and which Washington observers feared would strangle the bill were quickly compromised by the full Public Works Committee and in cloakroom conferences during debate itself.

Isolating these areas of conflict boosted the bill's chance of passage at once, and by the time the vote was called for most Congressmen were saying:

"This is not a perfect bill. It has weaknesses. But it is a good bill. It will start us rolling on a much-needed highway improvement job and we had better vote for it."

\* \* \*

Here is where the money will go:

● \$24.8 billion in federal funds, (13-year period) was authorized for construction of a 40,000-mile "National System of Interstate and Defense Highways." An estimated 85% of the superhighway network will be on new location. Apportionment of funds to states would be on a need basis (estimated cost to complete).

(continued on next page)

(The Congressmen insisted, however, that the estimates made by the state highway departments and compiled by the BPR last year be re-studied and revised.)

- \$725 million next year for the other federal-aid systems, to be boosted \$25 million each year, to \$1 billion annually by 1968. These funds will be extended on the traditional 50-50 basis. A state may transfer up to 20% of the funds from one system to another. The ceiling has been 10% heretofore.

- \$95 million annually for federal public lands roads, such as forest highways and park roads, in 1957 and '58. \$30 million for emergency reconstruction of highways disrupted by natural disorders.

\* \* \*

The push to have a Davis-Bacon provision struck from the bill developed into a brisk battle during floor debate, but lost out to labor-backed Congressmen. A compromise amendment, offered by Congressman Dondero of Michigan, to leave wage determinations to the states was defeated 192 to 77.

The greatest threat to passage of the bill - a bitter split over whether states should be reimbursed for the cost of toll or free roads already constructed on the Interstate System - was grudgingly resolved at the last moment in Committee. The Congressmen involved agreed to a clause in the bill expressing the "intent" of Congress to make such an adjustment after a study of the costs.

Some Congressmen rumbled about any reimbursement to utilities for the cost of relocating their lines but again a compromise amendment prevailed. The final bill provides that federal funds may be used in the same federal-state ratio as construction funds, within states which now reimburse.

\* \* \*

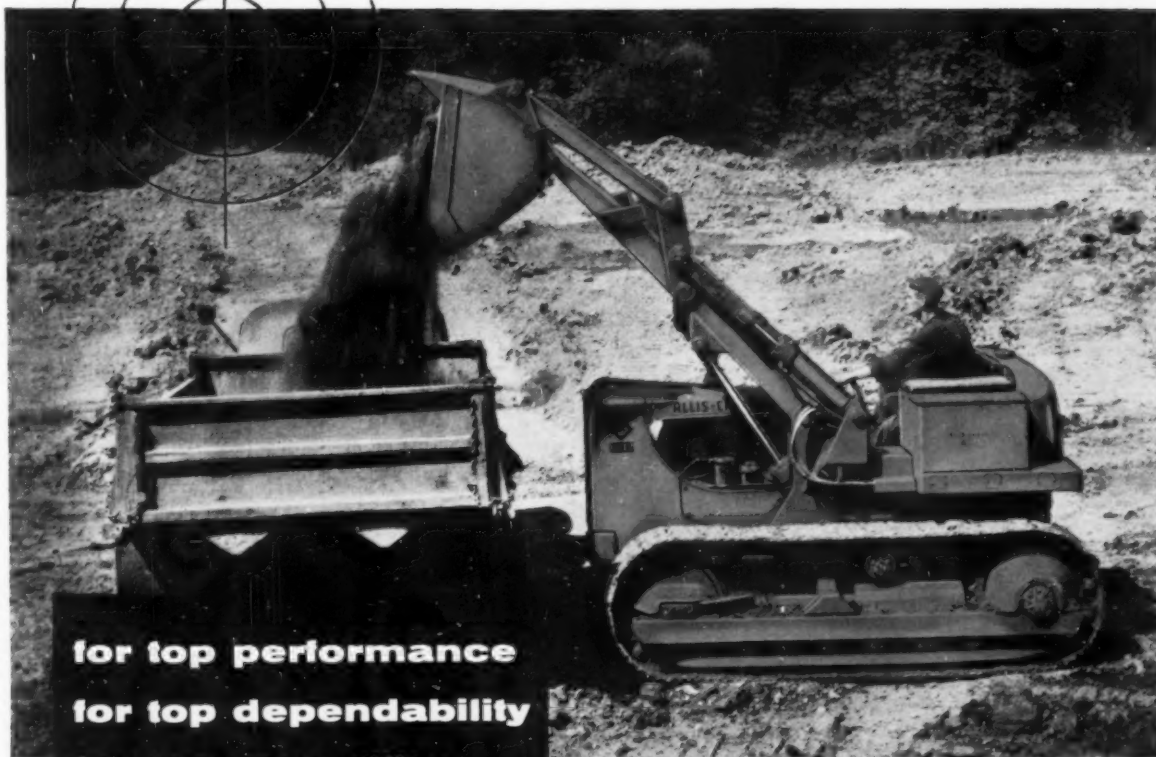
To help the states off to a flying start, Congress authorized the advancement of federal funds for right-of-way acquisition. Furthermore, where states are hampered in obtaining right-of-way for Interstate System projects, Uncle Sam may be requested to buy the property and later deed it to the state. The federal government would pay 90% of the cost, also.

Next step - hearings on the House bill's financing provisions by the Senate Banking and Finance Committee and then conference between representatives of both houses. The five-year, \$18 billion program passed by the Senate last year is significantly different in several respects from the House bill, but the overwhelming vote in the House is expected to dictate an atmosphere of compromise.

Adoption of the roadbuilding program by the House represents a major victory for highway organizations like the ARBA, AASHO, and others. While numerous groups were knocking the Fallon bill because of minor weaknesses, ARBA took the stand that difference must not be allowed to strangle action this session. For the first time in its 54-year history, the highway industry's Washington spokesman called on its members for a "Write-Your-Congressman" campaign in support of the bill. The strategy paid off handsomely.

(Next month: Roads and Streets will carry a special feature, "Blueprint for a \$51.8-Billion Federal-Aid Road Program," outlining the job ahead for contractors and state and city highway departments.)

## Set your sights on an HD-6G



**for top performance  
for top dependability  
for top versatility**

**1 1/2 yd bucket 55 belt hp 19,600 lb**

and all these exclusive on-the-job advantages important to both owners and operators . . .

**Allis-Chalmers long-life diesel engine** — power that handles tractor and bucket demands with ease.

**Heavy welded-steel shovel side frames and low stabilizer** — provide greater strength, low center of gravity, outstanding visibility.

**Full-flow filtering** — filters oil three ways, provides long-life protection for hydraulic system.

**Six truck-wheel stability** — almost 7 ft of track on the ground for superior balance.

**1 1/2-yd two-position bucket** — handles big loads efficiently in loose material or hard-packed dirt.

**All-steel, box-A main frame** — soaks up shock loads, protects the entire power train.

**One-piece steering clutch and final drive housing** — line-bored for true alignment of shafts and gears.

**Straddle-mounted final drives** — with bearings on both sides of gears to maintain correct gear tooth alignment.

**Simplified lubrication** (including 1,000-hour lubrication intervals on truck wheels, idlers and support rollers) provides extra working time.

**Unit construction** — makes service easier, faster. Major units can be removed without disturbing adjacent assemblies.

Plus husky wrap-around radiator guard . . . simplified piping . . . heavy-duty truck frames . . . heavy-duty, roller-bearing truck wheels . . . matchless control . . . and the convenience of 24-volt direct electric starting.

Check the complete service program offered by your Allis-Chalmers construction machinery dealer. His factory-trained servicemen, factory-approved facilities, and stocks of True Original Parts keep your equipment operating properly . . . provide the kind of service that saves you money. See him soon; he'll be glad to show you an HD-6G at work.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

# ALLIS-CHALMERS



. . . for more details circle 178, page 16

**ROADS AND STREETS, May, 1956**

# Made to Order for MUNICIPAL USE



**Mall**

**2MG ENGINE**

**POWERS ALL THESE ATTACHMENTS**



**A Complete Line of Gasoline  
Engine Portable Power Tools  
to speed your work...to cut  
your costs.**

Here's a power packed MALL 2-cycle gasoline engine designed to do many municipal jobs. This lightweight, compact and highly maneuverable engine can power a dozen attachments. These attachments save time and money for your community and can be purchased as the need for each arises.

This engine, coupled with attachments, gives you two or more power tools for the price of one. And, you can depend on MALL for the highest quality, top performing power tools available at the lowest price.

## MALL TOOL COMPANY PORTABLE POWER TOOLS GASOLINE • ELECTRIC • AIR

7744 South Chicago Ave., Chicago 19, Ill.

Send me the Free Gas Engine Tool Catalog—tell me more about MALL TOOLS for municipalities.

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MAIL-127094

... for more details circle 233, page 16

## Personals

### L. C. Higbee again heads Surveying Congress

LESTER C. HIGBEE, president of W. & L. E. Gurley, instrument makers, has been re-elected president of the American Congress on Surveying and Mapping, it was announced at the Congress' 16th annual meeting held recently.

The Congress met March 18-21 in Washington in conjunction with the annual meeting of the American Society of Photogrammetry, March 21-24, where new surveying equipment was displayed and numerous discussions were held.



Lester C. Higbee

### McCrary heads Western Penn. contractor group

EDWARD MCCRARY, JR., president of Edward McCrary, Jr., & Son Company of Pittsburgh, was elected president of the Constructors Association of Western Pennsylvania, at the Association's recent annual meeting. Mr. McCrary has served as a member of the Board of Governors and vice-president of the Association which represents heavy, highway and railroad contractors in the 33 western counties of Pennsylvania. He succeeds Allen D. McCombs, president, John F. Casey Company, Pittsburgh.

Also elected by the Association: Vice-president (Heavy), Anthony A. Benintend, Ben Construction Company; vice-president (highway), Charles H. Booth, Jr., Burrell Construction & Supply Co.; treasurer, Frank Mashuda, Frank Mashuda Company; secretary, Howard H. Sturdy, Dravo Corporation; assistant secretary, Richard A. Wetzig, Ferguson & Edmondson Company.

Three Association members were honored at the meeting with the presentation of bronze plaques for top records in accident prevention:

Burrell Construction & Supply Company, New Kensington, Pa., (Class I — over 400,000 man-hours) with 437,370 man-hours with only 4 injuries causing 11 days lost time.

Ralph Myers Contracting Corporation of Pitcairn, Pa., (Class II — 50,000 to 400,000 man-hours), with 96,115 man-hours without a lost time accident.

S. P. Lightholder of Canonsburg, Pa., (Class III — under 50,000 man-hours) with a record of 48,288 man-hours without a lost time accident.

George Kurtanich, superintendent, Ben Construction Co., received an engraved watch for his record of 43,523½ man-hours of supervision without a lost time accident.

Thomas Reynolds of S. P. Lightholder Co., received a similar award for 28,972 man-hours of supervision without a lost time accident.

*Bucyrus-Erie Announces*

# ALL-NEW DRAGLINE BUCKETS

Three types available —  
light, medium, and heavy.  
Offered with either solid or  
perforated baskets.

**NEW DESIGN!**

**NEW LIGHT WEIGHT!**

**NEW HIGH OUTPUT!**



A line of dragline buckets designed and built to set new high standards of performance — that's what Bucyrus-Erie now offers you. These new buckets include such high-production design features as:

1. "Slicing action" lip to penetrate material quickly and easily.
2. Tapered basket scientifically shaped to load full and fast.
3. Proper flaring and balance to minimize bobbing and spillage.

4. Smooth inside design and high arch for fast, clean dumping.

Along with outstanding design features, Bucyrus-Erie developed BECOLOY, a special steel alloy with a tough, fibrous structure that is especially suited to this type of service.

These new dragline buckets are built to introduce a new standard of performance — add new efficiency to your dragline operations. See your Bucyrus-Erie distributor soon for complete information — he is well qualified to help you select the right size and type for your job.



**BUCYRUS-ERIE COMPANY**

South Milwaukee, Wisconsin

... for more details circle 189, page 16

## SEND FOR FREE BULLETIN!

Gentlemen: Please send me a copy of your new dragline bucket bulletin.

Name

Company

Address

City  State

10R54C

Check

## PRICE PER POUND OF LIFT CAPACITY

Here is a sound way to measure the value of excavators and cranes. Compare machines on the basis of price per pound of lifting capacity. You'll very quickly learn which machine offers you the biggest production capacity per dollar of equipment investment.

Remember — lift capacity is *work capacity*. Obviously, the machine with heaviest lift rating not only picks up larger crane loads. It also has more strength, speed and stability with every excavator attachment to handle bigger loads on a faster operating cycle.

Check the Koehring lift ratings shown below — then ask your Koehring distributor to give you the figures on price per pound of lift capacity.



compare for yourself:

| KOEHRING<br>MODEL | SIZE<br>DIPPER | KOEHRING LIFT CAPACITIES<br>(Crawler ratings based on 75% of<br>tipping load. Rubber-tired machines<br>— 85% of tipping load) |                                  | PRICE PER<br>POUND OF<br>LIFT CAP.* |
|-------------------|----------------|---|----------------------------------|-------------------------------------|
| 205<br>CRAWLER    | ½-Yd.          | 20,000 lbs.   | 30-foot boom<br>at 10-ft. radius | ?                                   |
| 205<br>ON RUBBER  | ½-Yd.          | 30,000 lbs.   | 25-foot boom<br>at 12-ft. radius | ?                                   |
| 304<br>CRAWLER    | ¾-Yd.          | 27,800 lbs.   | 35-foot boom<br>at 12-ft. radius | ?                                   |
| 304<br>ON RUBBER  | ¾-Yd.          | 50,000 lbs.   | 30-foot boom<br>at 10-ft. radius | ?                                   |
| 405<br>CRAWLER    | 1-Yd.          | 40,000 lbs.   | 40-foot boom<br>at 12-ft. radius | ?                                   |
| 605<br>CRAWLER    | 1½-Yds.        | 72,300 lbs.   | 50-foot boom<br>at 12-ft. radius | ?                                   |
| 1005<br>CRAWLER   | 2½-Yds.        | 159,000 lbs.  | 50-foot boom<br>at 12-ft. radius | ?                                   |



\*Figures available on request—ask your Koehring distributor to see them.





**KOEHRING COMPANY** Milwaukee 16, Wis.

Subsidiaries: JOHNSON  
PARSONS • KWIK-MIX

... for more details circle 230, page 16

**ROADS AND STREETS, May, 1956**

# What Do You Get In A BUCKET-

**BALANCED DIGGING  
POWER**

**PROPER SHELL  
DESIGN FOR  
CAPACITY LOADS**

**LOW CENTER  
OF GRAVITY**



*Plus*  
"A MOUTHFUL AT EVERY BITE"  
**IF it's an OWEN BUCKET**

Yes, there are decided differences between OWEN clamshell buckets and clamshell buckets.

These differences originate in the engineering department, on the drawing board and culminate in actual superior bucket operation.

Make your own opinion-survey of "bucketwise" crane operators. You'll find the big majority of them will express a definite preference for OWEN buckets.

*Write for the Catalog...*



**THE OWEN BUCKET CO.**

6070 Breakwater Avenue • Cleveland, Ohio  
BRANCHES: NEW YORK, PHILADELPHIA, CHICAGO,  
BERKELEY, CALIF., FORT LAUDERDALE, FLA.

## New Publications

### ASTM concrete reference in new edition

SIGNIFICANCE OF TESTS AND PROPERTIES OF CONCRETE AND CONCRETE AGGREGATES. Special Technical Publication No. 169; 393 pp, 6x9, cloth cover \$6.00, heavy paper cover \$5.25.

An excellent series of papers by leading authorities on the subject of concrete. The scope has been expanded greatly over the previous editions (1935 and 1943), which dealt only with *significance of tests* of concrete, to include also the *significance of the properties* of concrete.

The subject matter has been divided into four principal groups. Part I — General includes four papers on sampling, statistical considerations, evaluation, and needed research. Part II contains 22 papers on the tests and properties of freshly-mixed concrete, hardened concrete, and special categories including ready-mixed and light-weight concrete and aggregates. Part III contains nine papers on tests and properties of concrete aggregates. Part IV contains four papers on tests and properties of other materials: Water, curing materials, air entraining admixtures and mineral admixtures.

This is probably the most important book sponsored recently by ASTM Committee C-9. It is an excellent text or text supplement for student use and an important reference for testing engineers and laboratory technicians; also useful to engineers and executives not expert in research and testing, but who are responsible for concrete construction and who must know what tests are required and significant for adequate job control and results.

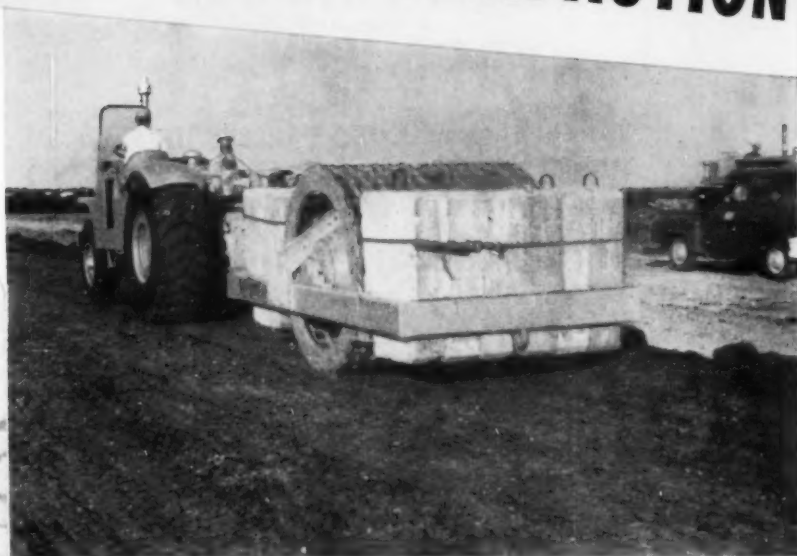
Copies of the book may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

HIGHWAY STATISTICS, 1954, issued by the Bureau of Public Roads, the tenth of the bulletin series presenting annual statistical and analytical tables of general interest on the subjects of motor fuel, motor vehicles, highway-user taxation, financing of highways, and highway mileage.

The 135-page publication may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 75 cents a copy. Orders should not be sent to the Bureau of Public Roads.

... for more details circle 240, page 16

# Now *this* is HIGH SPEED COMPACTION



**Over 1000 Cu. Yds. Compacted per hour  
with the HYSTER "GRID" ROLLER**

**High speed compaction** makes possible full productive capacity of earthmovers, and keeps costs down. Towed by high-speed prime movers like the Caterpillar DW15 Tractor, the Hyster Grid® Roller is ideally suited to work with modern high-speed earth-moving equipment.

**Example;** On a section 500 feet long, 24 feet wide (8 inch lifts) the "Grid" Roller, towed at an average rate of 11 MPH, compacted 300 cubic yards in 16 minutes.

**Example;** On a section 1200 feet long, 12 feet wide (8 inch lifts) the "Grid" Roller, towed at an average speed of 11 MPH, compacted 350 cubic yards in 23 minutes.

These important compaction **results** can mean **more profit for you!** But your profits don't stop here. The Hyster "Grid" Roller is as efficient for rock crushing and bituminous road salvaging as it is for compaction.

As a rock crusher, the "Grid" Roller speeds secondary road building by crushing pit-run material right on the sub-grade for surface or base courses.

As a bituminous salvaging tool, the "Grid" Roller (1) disintegrates and reclaims old mat material (2) compacts the base (3) rolls the new surface . . . thus saving up to 50% in time and material. Be sure to see the Hyster Job Reports on "Grid" Roller applications.



**For full details, call your Caterpillar Tractor Co. Dealer  
He is also your Hyster Dealer**

**HYSTER COMPANY**

2995-65 N.E. Clackamas Street, Portland 8, Oregon,  
1895-65 N. Adams Street, Peoria 1, Illinois,  
Hyster N. V., Nijmegen, The Netherlands.

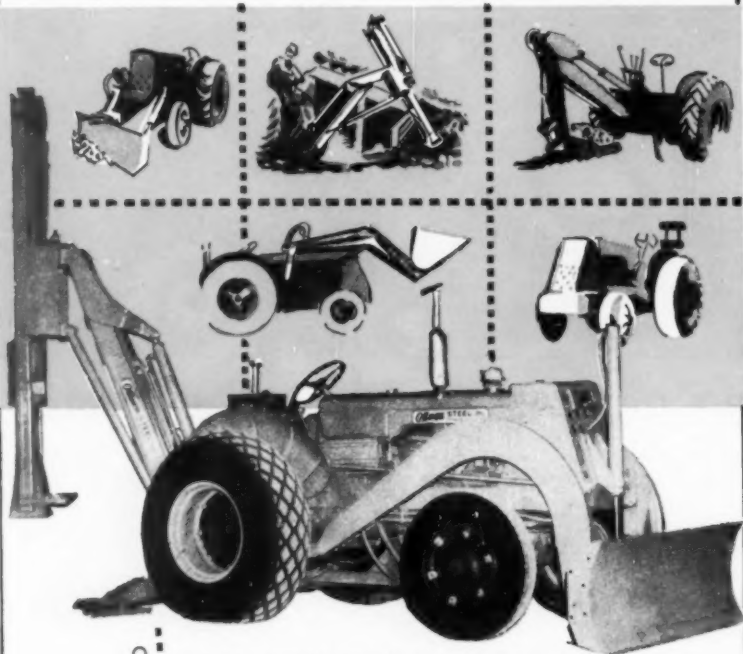
... for more details circle 223, page 16

**ROADS AND STREETS, May, 1956**



# the NEW ottawa MULTI-PURPOSE HYDRA-WAY

**DOES AN AMAZING VARIETY OF JOBS  
FASTER, BETTER AND AT LESS COST!**



CLIP COUPON BELOW AND MAIL

The HYDRA-WAY is a combination of:

- The Ottawa HYDRA-HAMMER tower and DEEP TRENCH TAMPER
- Heavy Duty 11' DEEP DIGGER BACKHOE
- Powerful ANGLE BULLDOZER or
- HYDRAULIC FRONT END LOADER
- 57 H.P. Prime Mover

The amazing HYDRA-WAY performs many operations. It breaks concrete, cuts asphalt, digs holes and trenches. It loads trucks without spill, removes snow, Bulldozes or Angeldozes. The multi-purpose HYDRA-WAY backfills and compacts backfill. It digs and carries one yard of earth—then turns around and COMPACTS it on the spot! It's one man operated . . . with famous Ottawa "One-Trol" humanized controls.

(Mfg'd. under Patents Nos. D-144,738; 2,417,021; 2,436,723; 2,476,390; 2,479,048; 2,659,583; 2,659,584; 2,669,367)



NAME \_\_\_\_\_ 26  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_  
STATE \_\_\_\_\_

**OTTAWA STEEL DIVISION**  
L. A. Young Spring and Wire Corporation  
50 Years of Progress — 1906-1956  
**OTTAWA, KANSAS**

. . . for more details circle 238, page 16

## Calcium Chloride manual off the press

Prepared specifically for highway engineers, contractors, and materials suppliers, Manual SM-1 "Calcium Chloride for Stabilization of Bases and Wearing Courses," is a comprehensive guide for dense-graded aggregate construction. The 40-page well-illustrated text includes section on properties, design, and construction methods, with specifications for bases and for wearing courses. The recommended use of calcium chloride in the materials, and advantages of its proper use are explained.

Single copies are available on request to the Calcium Chloride Institute, 909 Ring Bldg., Washington 6, D.C.

ON FLEXIBLE PAVEMENTS the Highway Research Board has published "Design and Testing of Flexible Pavements," Bulletin 114, containing four papers presented at the Board's 34th annual meeting, January, 1955.

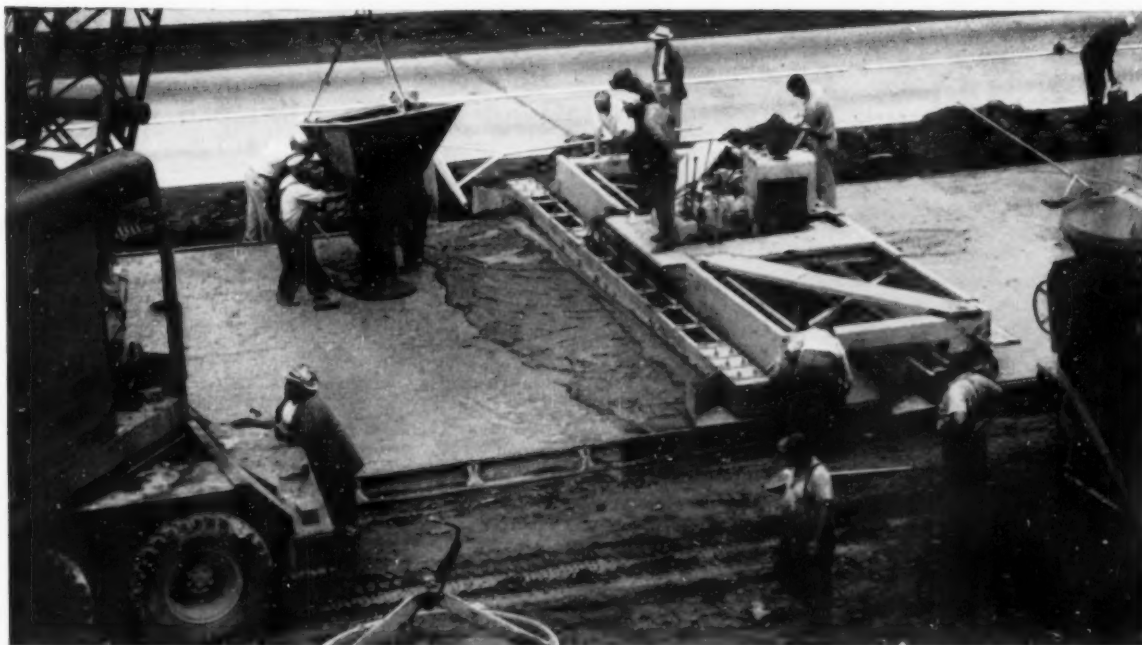
1. "Wheel-Load-Stress Computations Related to Flexible Design," by Chester McDowell, discusses the Texas triaxial method of flexible pavement thickness design, and gives a review of alternate methods for calculating stresses beneath wheel loads.

2. "Design, Construction and Evaluation of Heavy-Duty Runways," by W. H. Campen and J. R. Smith, reports the results of studies on two flexible type test sections constructed for 50,000-lb. wheel loads on airports in widely separated localities. The plate-bearing test method was used for evaluating each component in the layered system — subgrade, subbase, and base.

3. "Flexible-Pavement Design with Cone Device," by W. A. Wise, explains the procedure used in North Dakota to determine the necessary thicknesses of subbase layers for use under standard designs of base and surface course.

4. "Pavement Deflections and Fatigue Failures," by F. N. Hveem, comprises the latest chapter on the progressive development of a rational method for pavement design in California. The author starts with a review of the steps in design which he presented to the Highway Research Board in 1948. The present paper emphasizes the importance of fatigue failures or overstressing resulting from too great and frequent deflections under traffic loads.

Price \$1.65, remitted to the Highway Research Board, 2101 Constitution Ave., Washington, D.C.



FINISHING THIN LAYERS OF CONCRETE RESURFACING, 24' wide, without troweling or tearing, was accomplished with this Jaeger-Lakewood vibratory finisher. Only the front



PREPARATORY TREATMENT OF OLD SURFACE: Slab was first scarified, scrubbed with detergent and etched with dilute muriatic acid to remove all scale and oil drippings. A  $\frac{1}{4}$ " bonding layer of cement-sand grout was then applied to the cleaned surface.

screed was used. Screed is of "bullnose" type, carrying 5 vibratory motors. Three finishing passes were made, using a different vibratory action for each pass.

Six sections (two each of  $\frac{1}{2}$ ", 1" and 2" thickness) plus transition sections, were laid. Only the 2" sections were mesh reinforced. Concrete was designed for each section so that aggregates did not exceed 50% of course thickness. Water did not exceed 5 gallons per sack of cement.



7 DAYS LATER, the resurfaced section was opened to the flow of Turnpike traffic.

## Turnpike gets first thin concrete resurfacing with Jaeger vibratory finisher

FIRST experimental application of thin concrete resurfacing on a highway is on a 780' section of the Pennsylvania Turnpike, just east of Allegheny Tunnel. The job of finishing the thin ( $\frac{1}{2}$ " to 2") layers of dry material was successfully handled by a standard Jaeger-Lakewood finishing machine, equipped with a Jaeger "bullnose" vibratory front screed.

... for more details circle 228, page 16

**ROADS AND STREETS, May, 1956**

The development of the concrete finishing machine and the concrete spreader, the bullnose vibratory screed, the diagonal rear screed on finishers and the oscillating metering

screed on concrete spreaders—all these are Jaeger-Lakewood contributions to modern paving practice. For their application to your work, see your Jaeger distributor or send for Catalog.



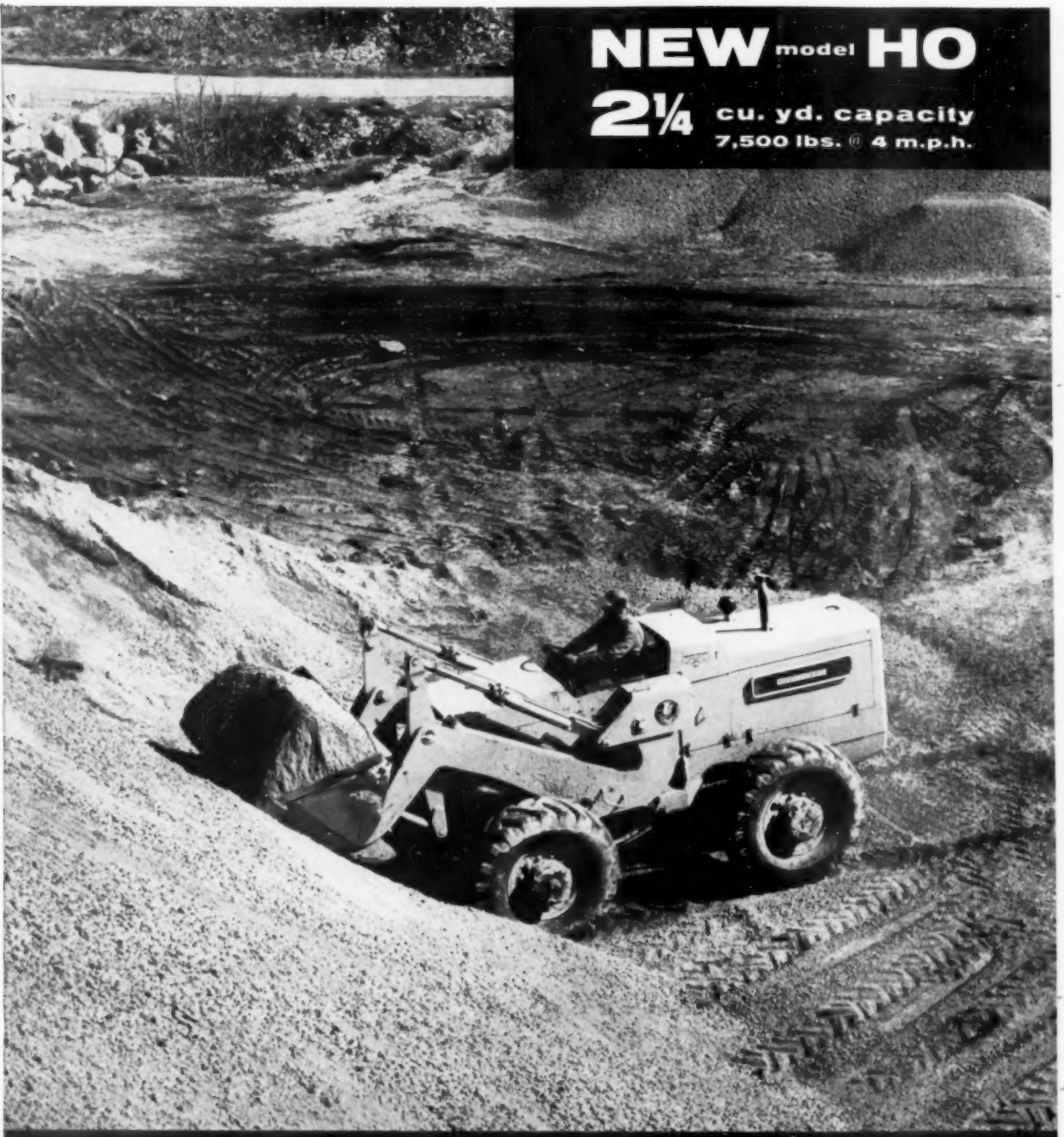
### THE JAEGER MACHINE COMPANY

223 Dublin Avenue, Columbus 16, Ohio

AIR COMPRESSORS • PUMPS • CONCRETE MIXERS • TRUCK MIXERS • LOADERS

**NEW** model **HO**

**2 $\frac{1}{4}$**  cu. yd. capacity  
7,500 lbs. @ 4 m.p.h.



**Gets Keeps Delivers**  
**MORE MORE MORE**

# More Productive Capacity

It's the yardage a tractor-shovel delivers per hour or per shift that counts, and that is why the big new model HO "PAYLOADER" is outstanding. Pound for pound it's way ahead of the field in digging power, in maneuvering speed, in carrying capacity. It *gets more* load because of the pry-out and 40 degree tip-back bucket action—it *keeps more* (less spillage) while carrying because of the shock-absorber cushioning of the bucket—and it *delivers more*.

It operates easier, rides smoother—with or without a load—than anything near its size. It has balanced design and durability *throughout* to work for you day after day without interruption. If you want big *productive* capacity you want this big model HO.

## HOUGH Design . . . Quality . . . Value

**Digging power:** Pound for pound, this "PAYLOADER" has more traction and digging power—for a wider range of ground conditions—than any wheeled tractor-shovel ever built.

**Less slippage:** New, exclusive feature—torque-proportioning differentials—reduce slipping, give better traction. Up to 24% more torque is automatically transferred to the wheel with best traction.

**Hydraulic shock absorber:** A shock absorber in the hydraulic system smooths out the ride, permits faster load-carrying speeds over rough terrain—with less spillage.

**More production, less effort:** Power-steer, power brakes (on all 4 wheels), power shift (no "clutching") and good riding qualities also lessen operator fatigue—promote full production all day.

**Stay-clean hydraulic system:** The hydraulic system is closed and pressure-controlled to keep air and dirt out—reduces oil foaming, lessens trouble and prolongs life of all hydraulic system parts.

*If you want the last word in tractor-shovel performance on your jobs, you'll want the big HO or a smaller 4-wheel-drive "PAYLOADER".*



**PAYLOADER®**

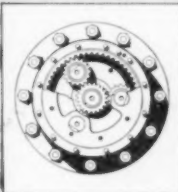
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



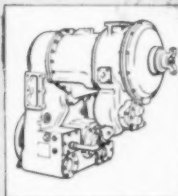
### Long-life, high-traction drive train

Torque-proportioning differentials, an exclusive feature, assure effective traction under slipping conditions. If one wheel starts to slip, more power is delivered to the opposite wheel. Rugged planetary final drives in the wheel hubs, plus hypoid differential gearing, keep torque low in axles . . . prolong life of axles and all drive train parts.



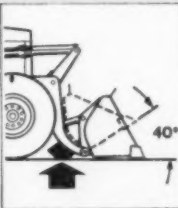
### Complete Power-shift Transmission

The fastest and easiest-operating transmission you've ever seen. All shifts can be made instantly on-the-go, under full engine speed. There's no stopping for a RANGE shift, there's no foot clutch. With the forward-reverse control, the operator can "creep" the machine at full engine speed, in any gear, while maintaining full bucket action . . . all this, plus torque converter drive.



### Tremendous pry-out action and 40° tip-back at ground level

Special pads are provided on the bottom of the boom arms to give ground support for powerful pry-out action. Load forces are also absorbed by the pads, relieving the axles and wheels of these strains. The bucket can tip back 40 degrees, before raising, to get heaped loads even in shallow cuts and low piles and to retain heaped loads.



### THE FRANK G. HOUGH CO.

768 Sunnyside Ave., Libertyville, Ill.

Send full information on "PAYLOADER" 4-wheel-drive tractor-shovels.

☐ model HO-2 1/4 cu. yd. ☐ model HH-1 1/2 cu. yd. ☐ model HU-1 cu. yd.

Name \_\_\_\_\_

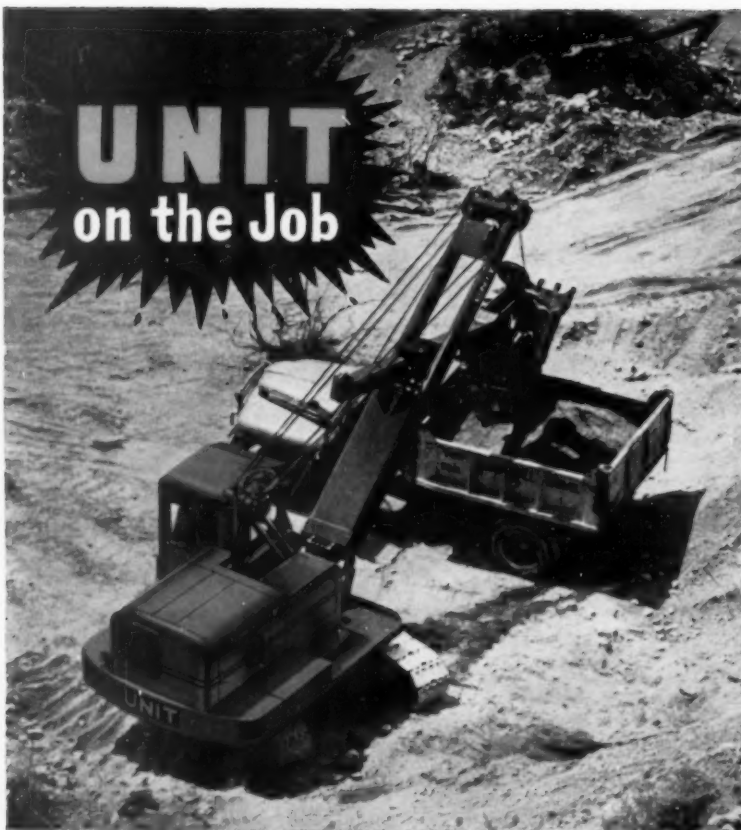
Title \_\_\_\_\_

Company \_\_\_\_\_

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City \_\_\_\_\_ State \_\_\_\_\_

# UNIT on the Job



## SWING SPEED makes PAY LOADS!

Here's a UNIT 1/2 Yard Shovel doing a PRODUCTION DIGGING JOB in a gravel pit. UNIT owners like the ease of operation and the FULL VISION CAB for complete visibility. They also like the sturdy construction and the many mechanical features, plus the ECONOMICAL PERFORMANCE and LOW UP-KEEP which all add up to EARNING POWER. Why not investigate what UNIT can do for you — on YOUR next excavating and material handling job?

**SEE FOR YOURSELF:** Let us send you our novel TV Brochure. It illustrates the complete UNIT line.

**UNIT CRANE & SHOVEL CORPORATION**  
6407 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.



1/2 or 3/4 YARD EXCAVATORS...CRANES UP TO 20 TONS CAPACITY  
CRAWLER OR MOBILE MODELS . . . GASOLINE OR DIESEL



**All Models Convertible to ALL Attachments!**

. . . for more details circle 265, page 16

## Diversion fight renewed

Although 1956 is an "off year" in the State Legislatures, with only 17 of them meeting, there is strong activity to wipe out diversion of highway funds to non-highway purposes. Some of the developments:

- Anti-diversion constitutional amendments are proposed in Maryland, New Jersey, New York, South Carolina and Virginia.

- Bills to change existing constitutional amendments have been introduced in Alabama and Massachusetts. Alabama presently diverts \$25 million annually of highway bond issue proceeds to school purposes; a Massachusetts proposal up for enactment would divert road money to schools and playgrounds.

Diversion is taking many guises. For example, in New Jersey a bill is pending which would take \$150 million out of motor fuel taxes for Veteran bonuses.

A Massachusetts bill seeks to recoup funds previously diverted, transferring \$5.2 million from the General Fund to the Highway Fund as partial repayment of amounts diverted between 1933 and 1948. Another Massachusetts bill pending, however, would disperse road funds by transferring \$25 million from long-range highway program funds to cities and towns to finance a "Work and Wages" program for local road improvement and unemployment relief.

## 12-Mile Jersey Turnpike extension approved

A link between the New York State Thruway and the New Jersey toll road system was assured by the signing of an agreement between the two states.

A 12-mile feeder road is to be built connecting the thruway and the Garden State Parkway.

When completed in the summer of 1957, this extension will also afford direct access to the New Jersey Turnpike at Woodbridge.

The 9.5-mile segment on the Jersey side will cost \$18,000,000, of which \$8,000,000 comes from temporary bank loans already obtained against a \$22,000,000 ultimate bond issue.

Mrs. Katherine E. White, chairman of the New Jersey State Highway Authority, and B. D. Tallamy, chairman of the New York Thruway Authority, characterized this link as one of extreme importance, which will probably bring an additional 10,000,000 vehicles of traffic annually by 1975.

## 1105...YES, ELEVEN-O-FIVE

Is the new-strength wire in Roebling's



AS SIZES and constructions go, Royal Blue is like the ropes you have used until now...but the likeness ends there.

Royal Blue is made of Roebling's new 1105 wire, the strongest, toughest wire developed up to now for use in any wire rope.

Royal Blue Wire Rope is as enduring as the wire from which it is made.

*Write us for full facts on Royal Blue Wire Rope, or contact your Roebling distributor.*

### ROEBLING

Subsidiary of The Colorado Fuel  
and Iron Corporation



JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5535 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13255 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6316 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 331 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.  
... for more details circle 245, page 16

ROADS AND STREETS, May, 1956



# TWICE THE SPEED and HALF THE MAINTENANCE



## **That's typical performance for BLAW-KNOX PF-90 BITUMINOUS PAVER FINISHER**

Rubber-tired mounting of the Blaw-Knox PF-90 Bituminous Paver Finisher gives you twice the paving speed with half the maintenance cost of crawler mounted units. Fast paving at up to 49 feet per minute, speedy returns for restarts at 4½ MPH and quick, easy maneuvering allow you to make fast work of every paving job. By eliminating 500 to 600 parts characteristic of crawlers and by reducing vibration that causes wear and tear on the paver, you will have only half the maintenance of ordinary bituminous pavers.

You get this speed and low maintenance without sacrificing ability to meet the most rigid performance requirements. The PF-90's long wheelbase and power steering assure great accuracy and extreme smoothness of course. It has proved it can meet the most rigid state paving specifications — already more than 30 states have approved it and others are being added every month. It also has the traction to handle boxcar size trucks on tough grades and its big hopper will handle approximately 10 tons of asphaltic materials.

See your Blaw-Knox dealer — he can give you the details on the PF-90 that will allow you to bid low and make more money on every contract.



**BLAW-KNOX COMPANY, Mattoon, Illinois**

44 Charleston Avenue

**Construction Equipment Division**

... for more details circle 188, page 16

# How to switch "rigs" on the go... get "four-for-one" machine utility!

From the seat and on-the-go you instantly get any material-moving action you need with an International® Drott® Four-In-One!

You'll be cascading dirt in dozer position and suddenly need carry-type scraper action. Touch the "machine selector" lever with finger-tip ease, and you have it—to grade, strip, or spread with accurate clam lip control!

Touch! again, for Skid-Shovel position. And with exclusive Drott triple-power, pry-over-shoe break-out action, you can be tearing up and loading stuff as tough as concrete pavement—often where even a power shovel fears to tread!

Touch! once more—and a fast-working clamshell can be gulping aggregate in a space barely big enough to contain your outfit! And giving you a "hopper-high" dumping reach, 30 inches above ordinary roll-forward buckets!

**Prove to yourself** a Four-In-One will save uncounted hours of changeover time—give 4-machine utility for one moderate investment. Now available in 3 sizes: 1-yard to 2¼-yard capacity, all with the built-in protection of exclusive, shock-swallowing Hydro-Spring. Ask your International Drott Distributor for a Four-In-One demonstration!



**Material-Loosening Scarifer Attachment!** It's simple to install this scarifer attachment, to speed straight-forward bucket loading. The third or extra valve (which is standard equipment on all Drott Skid-Shovels) is used in this operation. This hydraulic-controlled scarifer has deep penetration, and strength for hard materials. See and try it!

... for more details circle 275, page 16

**ROADS AND STREETS, May, 1956**

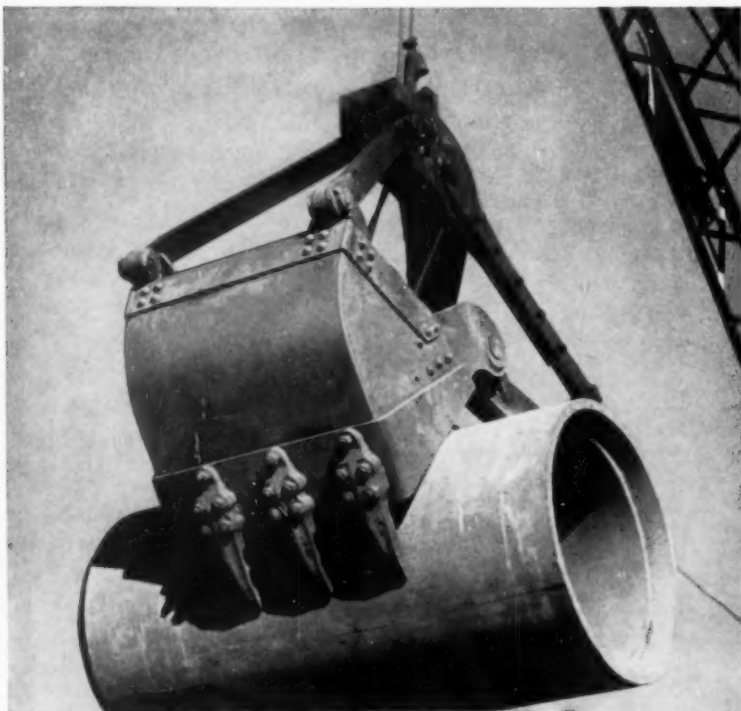
International Harvester Company, Chicago 1, Illinois  
Drott Manufacturing Corp., Milwaukee 8, Wis.



**INTERNATIONAL®**  
**DROTT**

# "OUR ERIE STRAYER BUCKET IS THE MOST VERSATILE TOOL WE OWN"

• States Edward J. Petrillo, President, Edward J. Petrillo, Inc.



*On the job photo shows an ERIE bucket's no-slip grip on concrete pipe being moved at Edward J. Petrillo, Inc. on the New York Thruway.*

The change-over from clamshell bucket to grappling hook costs time and money—to say nothing of the extra man needed to work the hook. That's where an ERIE bucket's versatility pays extra dividends.

Like Mr. Petrillo, many satisfied owners use their ERIE not just to dig and load sand and gravel, but to move boulders, sewer pipe, steel girders, concrete slabs, logs, and old lumber.

An ERIE Strayer bucket is nimble, too. Its great power is perfectly balanced and easily controlled. Operators appreciate this feature—especially when digging in corners, along edges or loading hoppers in tight quarters.

These better buckets provide these "wanted" features:

1. Top closing power from block and tackle, plus lever arm construction, plus precision balancing.
2. Manganese steel teeth and high carbon steel lips that bite up full payloads of even toughest clay and gumbo.
3. Rigid, one-piece, welded head that shrugs off bumps and jars. No shimmy. No wobble.
4. Two-line, continuous reeving. Adds up to 50% to cable life. Less down-time for reeving.
5. Low head room for fast work in tight quarters; low center of gravity for easy positioning.



For catalogs, write Dept. RS56.

## ERIE STRAYER CO.

3856 GEIST ROAD • ERIE, PENNSYLVANIA

### Contractor association comments on "specs"

*Bulletin to member contractors from the Virginia Road Builder's Association.*

Our industry has, for many years, been working under the standard road and bridge specifications of the Department of Highways. In that period, we have had a sort of unwritten understanding that these specifications were sufficiently broad to permit certain variations to meet local conditions. In other cases, there have been certain well established practices which were regarded by both the engineer and the contractor alike as being satisfactory without being written into the specifications. In neither of these cases has the State or the contractor had unfair advantage taken of them, and the result has been, in the past, a better road or bridge at less cost for the taxpayer.

We note, however, that there is a definite trend toward a more literal interpretation of these specifications and that this trend tends to nullify some of the practices which were generally acceptable in the past. Literal translation of the specifications can seriously affect the cost of performing highway work and you should take note of this fact when bids are being submitted.

We also call attention to the long "chain of command" which operates in the Department. The processing of change and work orders is materially slowed by the length of the channel through which they must pass, and the result is time consuming and cost increasing as far as the contractor is concerned. This factor also warrants your full consideration since it might well mean that the profit expected on an item involved in a change order may well be consumed in lost time by your force of workmen waiting for the final execution of the order.

The truth of the matter is that, insofar as construction is concerned, we do not have one Highway Department but eight. Each District has its own interpretation of certain rules and regulations, and while they are all supposed to be alike, they are, in practice, far from standard.

This is not a criticism of any one but simply an observation of those practices which make it difficult for you to operate.

Believing that "forewarned is forearmed," we pass them along to you as a matter of information.

## Take a tip from builders of great American roads



*Edsel Ford Expressway, important new traffic artery in Detroit, Michigan, is reinforced with American Welded Wire Fabric.*

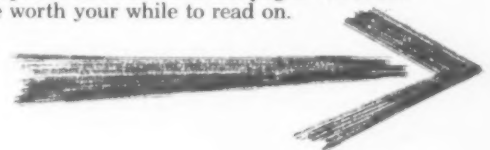
Take a tip from the Pennsylvania Turnpike Commission, the Ohio Turnpike Commission, the Indiana State Highway Department, and others who are lacing America together with a network of outstandingly fine superhighways and thruways. Take a tip from them and use quality construction materials manufactured by American Steel & Wire to increase the life, the comfort, and the safety of your new roads.

Make your Portland Cement concrete slabs 30% stronger, at extremely low cost, with American Welded Wire Fabric. You will find it easy to handle . . . readily available in any size and style you need (greatly expanded manufacturing facilities assure this).

Use longer concrete slabs for smooth riding, to reduce installation costs and speed construction. Use American Road Joints to provide proper load transfer for a balanced pavement design.

Help prevent off-road crashes with Multisafety Cable Highway Guard and American Beam-type Highway Guard.

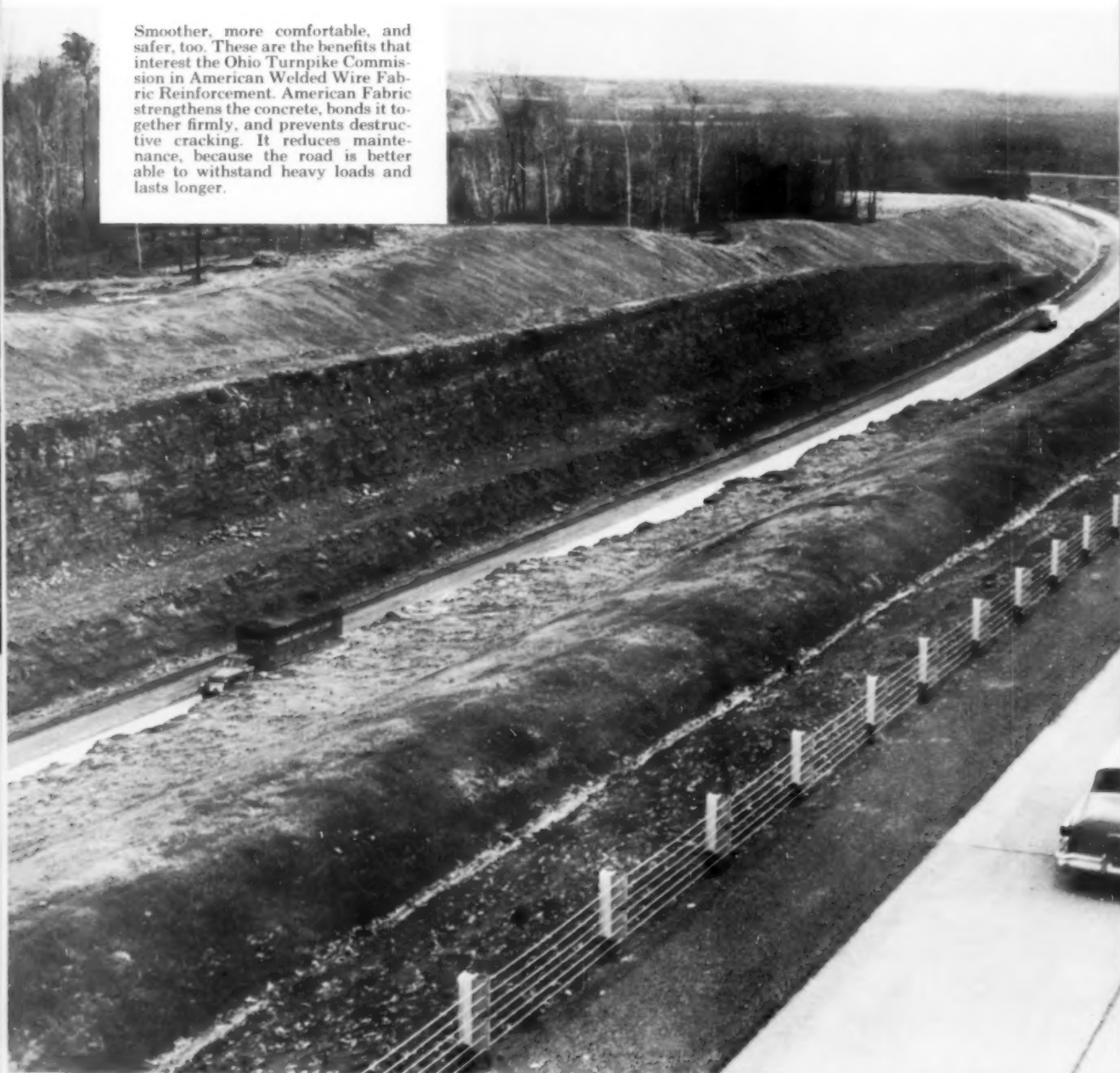
You will find interesting new applications of these fine products on the next few pages. We think it will be worth your while to read on.



# On a great "AMERICAN" road

## ... American Fabric and Road Joints reduce ... American Highway Guard reduces fatal

Smoother, more comfortable, and safer, too. These are the benefits that interest the Ohio Turnpike Commission in American Welded Wire Fabric Reinforcement. American Fabric strengthens the concrete, bonds it together firmly, and prevents destructive cracking. It reduces maintenance, because the road is better able to withstand heavy loads and lasts longer.



## USS American Welded Wire Fabric

# —THE OHIO TURNPIKE

## maintenance accidents



Multisaftey Cable Highway Guard makes this section of the famous Ohio Turnpike safer. The precipitous drop needed extraordinary protection. A special six-cable Multisaftey Guard was designed to assure maximum protection. Elsewhere on the turnpike, four cables were used.



The longer reinforced slabs on the Ohio Turnpike provide a low cost, smooth-riding surface. And specially designed American Road Joints were used to keep the slabs in proper alignment and to provide adequate load transfer for a balanced pavement design.

Expanded facilities for the manufacture of American Welded Wire Fabric now make it readily available in wire sizes up to and including  $\frac{1}{2}$ " in diameter, at 2", 3", 4", and 6" on center. American Fabric increases the life of both Portland Cement Concrete and asphaltic concrete pavements. It meets ASTM Specification A 185-53T.

When it comes to safety, remember that USS Multisaftey Cable Highway Guard protects in two ways: it restrains uncontrolled vehicles and it cushions the impact of collision between vehicle and guard.

Send this coupon for complete facts about American Steel & Wire products that can increase the safety and help reduce the long-term cost of your roads.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO  
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS  
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

### FREE TECHNICAL DATA

American Steel & Wire  
Dept. 56-C, Rockefeller Bldg.  
Cleveland 13, Ohio

Please send complete information on the following products:

- |   |   |
|---|---|
| <input type="checkbox"/> American Welded Wire Fabric for Portland Cement Concrete | <input type="checkbox"/> American Road Joints             |
| <input type="checkbox"/> American Welded Wire Fabric for Asphaltic Concrete       | <input type="checkbox"/> Multisaftey Highway Cable Guard  |
| <input type="checkbox"/> American Welded Wire Fabric for Airport Runways          | <input type="checkbox"/> American Beam-type Highway Guard |
| <input type="checkbox"/> American Wire and Strand for Prestressed Concrete        |   |

Name .....

Firm .....

Address .....

City .....

State .....

# USS Multisaftey Highway Guard



UNITED STATES STEEL

## 3 MORE GREAT "AMERICAN" ROADS

### **John Lodge Expressway strengthened with American Welded Wire Fabric**

This outstanding urban thruway and its companion, the Edsel Ford Expressway, in Detroit, were reinforced with American Welded Wire Fabric for longer life, reduced maintenance.



### **Maine Turnpike protected with American Highway Guard**

On this particular section of the Maine Turnpike, highway engineers preferred a beam-type guard and American Steel & Wire supplied it. On other sections of this important northeastern road, USS Multisafty Cable Highway Guard is being used.



### **Indiana Toll Road strengthened with American Road Joints**

Scheduled for completion late this year, the new Indiana Turnpike is another important link in a growing network of East-West superhighways. American Welded Wire Fabric, together with adequately reinforced joints, provides maximum corner protection for this concrete pavement.

For complete information about Construction materials manufactured by American Steel & Wire, send the coupon on the previous page.



# USS American Welded Wire Fabric USS Multisafty Highway Guard



UNITED STATES STEEL

**Ask**

**Cedarapids**

Built by  
IOWA

## Owners about Profit...

Someplace near you there's sure to be a Cedarapids plant working. Ask the owner what he thinks about the performance of that plant!

We'll bet you get answers like these—

*"We're crushing 100%, averaging 105 tons per hour, with no maintenance costs in 12 months' operation"—a New York Commander owner.*

*"The only competition I have around here is another Cedarapids plant"—a Wisconsin crushing plant owner.*

Call your Cedarapids distributor for the location of the nearest working Cedarapids plant—then ask him to explain the Cedarapids features that will make more money for you.

### SUSQUEHANNA QUARRY CO.

produces

**150 TONS PER HOUR**

of crushed rock for

**Pennsylvania**

**Turnpike Extension**

Set up to produce about 75,000 tons of crushed stone for sub-base on the north end of the Pennsylvania Turnpike Extension, this 3-unit Cedarapids plant is turning out 150 tons per hour for Susquehanna Quarry Co., Millersburg, Pa. Rock from an abandoned strip mine is fed to the 25"x40" primary jaw crusher over a vibrating grizzly which bypasses fines before they reach the crushing chamber to permit greater production of crushed material from the Portable Primary unit. The versatile Cedarapids Commander is used for secondary reduction and delivers finished material directly to the truck loading hopper.



# IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U.S.A.

... for more details circle 226, page 16

**ROADS AND STREETS, May, 1956**

## Remember these points in sealing highway joints...



## PRESSTITE No. 77 Joint Sealer ...has them All!

- Cold applied
- No heating
- No mixing
- Application even at low temperatures
- Non-running at high temperatures
- Tenacious bond under repeated expansion-contraction cycles of pavement
- Permanent flexibility, resiliency and adhesiveness
- Impervious to water or moisture
- Resists heavy impact, high-speed traffic

WRITE for working samples,  
technical data, literature.

**PRESSTITE**  
SEALING COMPOUNDS  
**PRESSTITE ENGINEERING COMPANY**  
3782 Chouteau Ave. • St. Louis 10, Mo.

... for more details circle 241, page 16

## Meetings Ahead

SOCIETY OF AMERICAN MILITARY ENGINEERS — annual meeting, Washington, D.C.; May 14-15.

PRESTRESSED CONCRETE INSTITUTE — Second Annual Convention, Hollywood Beach Hotel, Hollywood, Florida; May 16-18.

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS — annual meeting, Ambassador Hotel, Atlantic City, N.J.; May 23-26.

SCHOOL FOR HIGHWAY SUPERINTENDENTS — Cornell University, Ithaca, New York; June 18-20.

AMERICAN PUBLIC WORKS CONFERENCE — Annual Congress and Equipment Show, Fort Worth, Texas, Sept. 23-26.

## Cement production expanding

New facilities capable of producing 46 million additional barrels of finished Portland cement are being built and are scheduled to be completed by the end of 1956, according to a recently completed study published by the Department of Labor and Commerce. The study also found that in the past year new expansions came into production with 17 million barrels capacity bringing the industry's potential output to 311 million barrels at the start of 1956.

The expansion program of this industry, including recent additions, work now underway, and further plans extending to the end of 1958, may add about 100 million barrels to 1954 capacity, an increase equal to the total increase achieved in the previous 30 years.

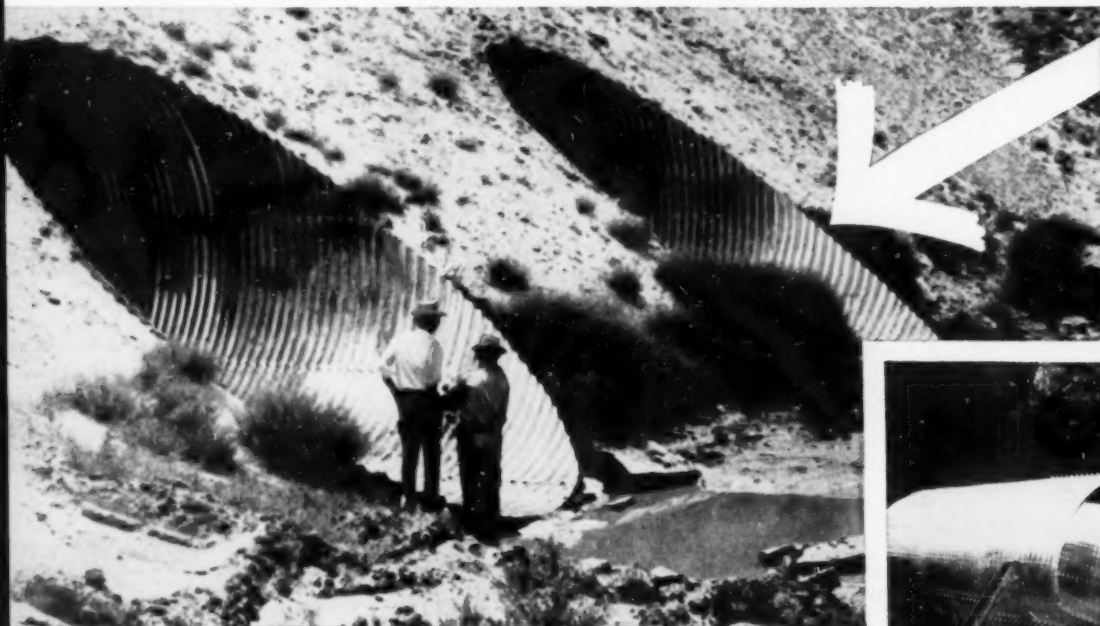
## Grade-crossing accidents

A study by the Bureau of Transport Economics and Statistics of the Interstate Commerce Commission shows a total of 78,036 grade-crossing accidents in the 20-year period from 1935 through 1954, in which 33,558 persons were killed and 86,278 injured. Motor vehicles figure in about 90 per cent of all crossing accidents. There were 226,522 crossings at grade in 1954, or 3.3 per cent less than in 1935. Elimination by separation of grade averaged 258 per year in the period from 1935 through 1942 and 44 per year in the period 1943 through 1954. The study brings out other aspects of grade-crossing accidents and the problems they present to railroads and public authorities.

**ROADS AND STREETS, May, 1956**

**NOW AVAILABLE**

## **AMBRIDGE** Sectional Plate for any shape or size of pipe, arch, or pipe-arch



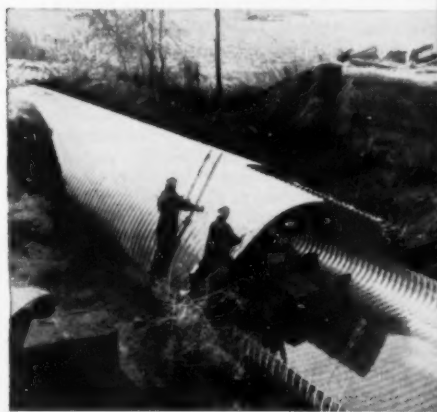
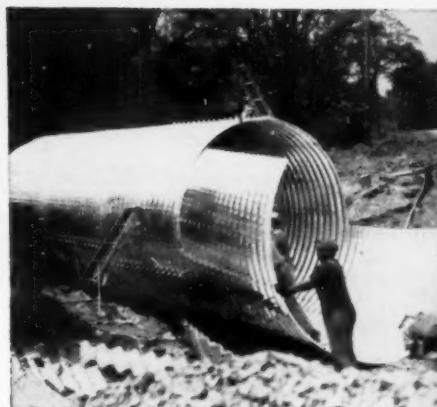
**to save you time and money in  
building low-cost drainage structures**

AMBRIDGE Sectional Plate for Pipes, Arches and Pipe-arches is fabricated to meet the specifications of the American Association of State Highway Officials and can be adapted to all state, railroad and government specifications.

The plate is fabricated with 2" deep corrugations on 6" centers with standard punching, and *galvanized after fabrication*.

AMBRIDGE Sectional Plate is furnished to accommodate any shape or size of pipe, arch, or pipe-arch, complete with bolts. Special details, such as asphalt coating, hook bolts, beveled ends, and skewed ends, are furnished as specified for each job.

For further information, we suggest that you contact the office nearest you. Or, an inquiry direct to our Pittsburgh headquarters will bring detailed information.



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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

# **AMBRIDGE** *Sectional* **PLATE**

UNITED STATES STEEL

# A complete line of 5 "EUC" SCRAPERS...

*more*

**WORK-ABILITY...**

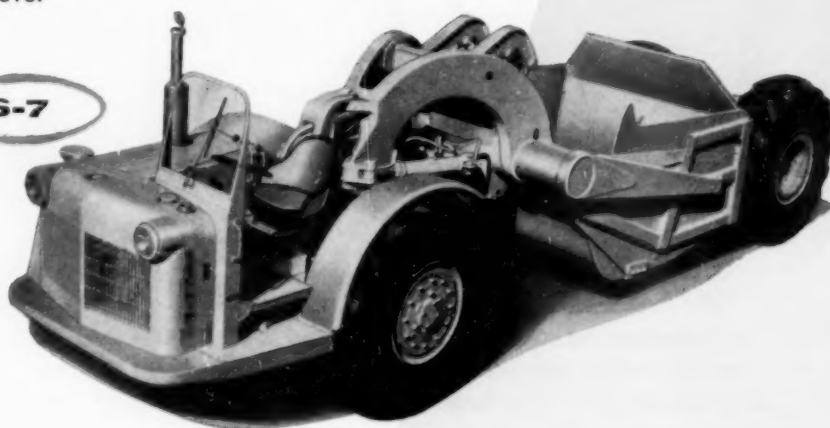
Customer acceptance and preference has made "Euc" Scrapers the fastest selling line in the industry. The simple, practical design of every Euclid scraper model is years ahead of the field in ease of operation and maintenance and in production performance. Like all other Euclid earth moving equipment, "Euc" Scrapers are built to stay on the job longer with less down time for servicing and repair. For example, lever

*Better*

**ACCESSIBILITY**

action provides fast, positive and independent control of bowl, apron and ejector without cable or sheave expense. The 4 section cutting blade has long life and assures efficient loading in any material. All major components are readily accessible—a mighty important cost cutting feature—in both the single axle and four wheel tractor models.

**S-7**



The S-7 has better than 20 h.p. for each yard of payload—a 143 h.p. engine and 7 cu. yds. struck capacity. It's primarily designed for small yardage jobs and for work in close quarters where maneuverability is essential—non-stop turning width is 28 ft.—tires are 18.00 x 25 with 21.00 x 25 optional for work in sand or other tough job conditions.

**S-12**



For medium size jobs or as a utility machine on large projects, this S-12 is the answer. Payload capacity is 12 yds. struck and 16 yds. at 1:1 slope. Powered by a 218 h.p. engine, this model has a top speed of 28 mph with full payload — makes a non-stop 180° turn in 31 ft. Tires are 26.50 x 25 — width of cut is 9' 6".

**EUCLID DIVISION**  
**GENERAL MOTORS CORPORATION**  
Cleveland 17, Ohio

# 7 to 18 yds. struck payload • 143 to 518 h.p.

for a wide range of work—small jobs to big projects



This 15.5 yd. Scraper has built-in performance that gets more work done. It is powered by a 300 h.p. engine with either a 10-speed transmission or Torqmatic Drive—has a heaped capacity of 21 yds. at 1:1 slope, 18 yds. at 3:1. Cutting width is 10 feet. Drive tires are 24.00 x 25 standard with 29.50 x 25 available as optional equipment. The extra speed and stability of this "Euc" really pays off on long hauls.



With Torqmatic Drive and 300 h.p. engine, the S-18 hauls heaped loads up to 24 yds. at fast travel speeds—struck capacity is 18 yds. Standard tires are 27.00 x 33 with 33.50 x 33 optional for maximum traction and flotation on tough jobs. In spite of its size and capacity, the S-18 makes a non-stop 180° turn in only 36 ft.



The TS-18 is the most recent development in the Twin Power principle pioneered by Euclid. It is powered by two 218 h.p. engines—one in the tractor and one behind the scraper bowl. Both engines drive through separate Torqmatic Drives. Where even more power is required the tractor can be supplied with a 300 h.p. engine. It is a truly self-loading machine due to its tremendous power and traction—works on grades and under conditions that stymie other scrapers and is a one-man earthmoving outfit. Standard tires are 27.00 x 33—with 33.50 x 33 available as optional.

For profitable scraper production and performance

**Euclids are your  
best investment**

## Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



for more details circle 218, page 16





Morauer & Hartzell, Inc., Washington, D. C., used Waukesha Diesel powered Lorain shovels on New York Thru-Way.

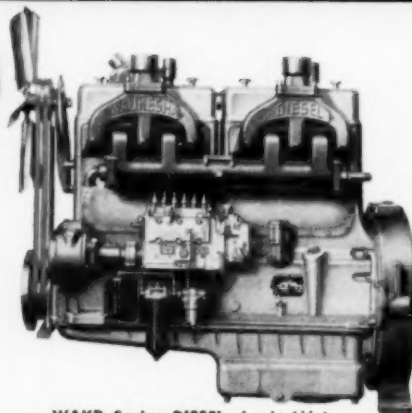
## HERE on the NEW YORK THRU-WAY

... and big jobs everywhere with

# WAUKESHA

## Diesels

- easy to start
- quick to warm up
- snappy acceleration
- big reserve of power
- high fuel economy
- most economical upkeep



WAKD Series DIESEL—6-cyl., 6 1/4-in. x 6 1/2-in., 1197 cubic inch displacement.

● Diesels for super duty—that keep on putting out the power! Patented Waukesha combustion chamber controls combustion to meet the needs of the job. ● Advanced design features include hardened 7-bearing crankshaft...torsional vibration dampener...heavy-duty aluminum alloy pistons, oil cooled, with chrome plated top piston rings...special alloy wet cylinder sleeves...Stellite faced valves and valve seat inserts...built-in oil cooler...thermostatic water temperature control. Send for Bulletin 1415.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN  
NEW YORK • TULSA • LOS ANGELES



301

... for more details circle 267, page 16

### When getting equipment started was headache

AGC president George C. Koss reminisced in his talk at recent AED meeting in Chicago:

"In 1921 when our company was engaged on its first highway paving project, the biggest task of the day was getting the equipment started. And there weren't many pieces in those days. Or as one of our former bridge superintendents said to me last year, 'The world's greatest invention was the development of the self-priming pump.' He could well remember those primitive days.

"To me the finest thing about the development of the equipment industry and the construction industry, has been the introduction of labor-saving machinery. I am not talking about increased capacities, but about the machines that no longer make it necessary for a man or a group of men to heave and strain to do a job that can so easily and gracefully be done by machine.

"No longer are our accident report files filled with reports of strained backs and hernias. Not only have all of us in the industry made the work of our men easier and safer, but on a unit basis we have made it cheaper.

"For years a contractor has heard from both his bankers and surety men that famous remark, 'Why, you are just working for the equipment man.' Perhaps that is true, but it is also true that the contractor who didn't work for the equipment man isn't with us today — at least not as a competitor. Net working capital isn't everything."

### Fire Equipment for Thruway

Indicative of the degree in which toll road authorities are concerned with the welfare of patrons, is the decision recently of the New York State Thruway Authority to purchase fully-equipped fire-fighting trucks for handling emergencies on the 427-mile highway. 18 such trucks have been advertised for bids.

Bidders have been asked to furnish a pilot model of the equipment they propose for this work, which will represent pioneering of features to aid in handling emergencies in the midst of high-speed-traffic. Specifications require a truck equipped with a cab-mounted, remote-controlled nozzle, various types of hose, a 330-gal. water tank, a 20-gal. foam tank, a 5-gallon "wet water" tank, and several types of portable fire extinguishers. Each truck also will carry a 12-ft. ladder, a crowbar, fire axe, traffic control signs, and similar emergency equipment.

ROADS AND STREETS, May, 1956

# Planning better roads

by **INTERNATIONAL SALT COMPANY, INC.**—America's largest producer of salt



## Stabilizing Base Course with Rock Salt Is Efficient, Economical

An increasing number of states and highway departments are now using rock salt to stabilize road base course. The main reason for this is that rock-salt-stabilization gives the base course complete, long-lasting protection against extremes of temperature and weather. Rock salt actually combines with soil to give it added density, water-tightness, and resistance to frost. Result: roads that stand up longer . . . and need less maintenance.

Rock salt provides this remarkable stabilization in three different ways—conforming to severest weather conditions. Here they are:



**During heavy rains** the salt and clay in the stabilized soil form a colloidal jelly. This jelly acts as a barrier to the seepage of further moisture from any direction. As a result, the stabilized base is actually sealed off from water damage.



**In extremely dry weather,** salt in the stabilized base recrystallizes and holds the soil fines in place. Thus, the original density of the soil is maintained. This recrystallized

salt also shields the road base from heat, helping to preserve necessary moisture in the lower layers. Partially recrystallized salt also fills the natural voids that occur in road base during temperature changes. This is another way "potholing" is prevented.



**In freezing weather,** frost cannot readily penetrate rock-salt-stabilized soil. This is because salt acts as an antifreeze, lowering the soil's freezing point. With salt-stabilized base courses, the occurrence and severity of frost heaving are greatly reduced—and resultant surface breakup is minimized.

**Economical, too.** Another important reason for the growing popularity of rock-salt-stabilization is its low cost. Rock salt itself is an inexpensive and readily available material—and applying it to roads requires no special equipment. This method of stabilization can generally be accomplished quickly and conveniently, too—thus reducing equipment and labor costs. And after stabilization with rock salt, road maintenance expenses are often substantially decreased.

### ROCK-SALT-STABILIZATION PERMITS ROADS TO BE BUILT IN STAGES

This is an important feature in many road-building or reconstruction programs. Because the salt-stabilized base course is hard, smooth, and long-wearing—it can successfully be used as the wearing course for as long as several years. When the bituminous or concrete wearing course is finally applied, the base course provides all the advantages detailed here.



This heavily traveled gravel road in the Midwest was stabilized with Sterling Rock Salt, produced by the International Salt Company. Road surface is reported to be hard, smooth, and virtually dustless. It now requires only infrequent maintenance.

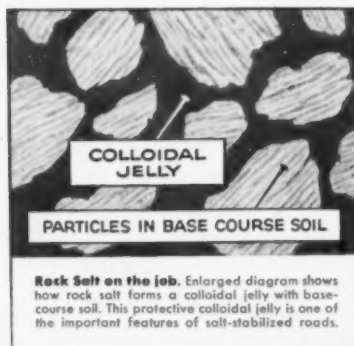


### Free Technical Assistance on Road Stabilization

International Salt Company will be glad to help you work out an effective, economical rock-salt road-stabilization program for your system. There's no cost or obligation. Just contact your nearest International sales office.

For further technical information on rock-salt stabilization, write for International's free series of booklets "Better Highways." Address: International Salt Co., Inc., Scranton 2, Pa.

**Sales offices:** Atlanta, Ga.; Chicago, Ill.; New Orleans, La.; Baltimore, Md.; Boston, Mass.; Detroit, Mich.; St. Louis, Mo.; Newark, N. J.; Buffalo, N. Y.; New York, N. Y.; Cincinnati, O.; Cleveland, O.; Philadelphia, Pa.; Pittsburgh, Pa.; and Richmond, Va.



FOR ROADS, INDUSTRY, FARM, AND HOME—  
**STERLING SALT**  
PRODUCT OF INTERNATIONAL SALT CO., INC.



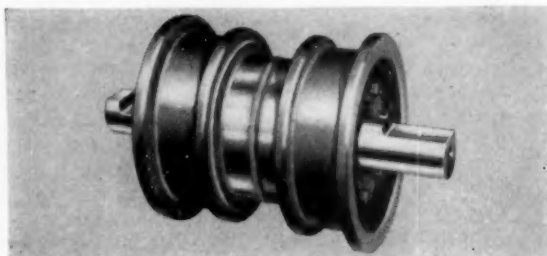
Do you believe one make of parts is as good as another?

Take track rollers. You can buy substitutes that look on the outside like Caterpillar originals. But a Cat-built track roller has deep hardened rims of forged steel. Forging keeps rims free from the accidental defects often found in castings. The roller shaft is one-piece and induction-hardened. The seals are self-aligning, of double-tanned leather to *really* keep lubricant in, water and dirt out. You're *sure* of extra wear, extra life — on the toughest jobs.

With substitute parts, can you be sure of anything?

See your dealer's Parts Representative — better get Caterpillar original parts every time.

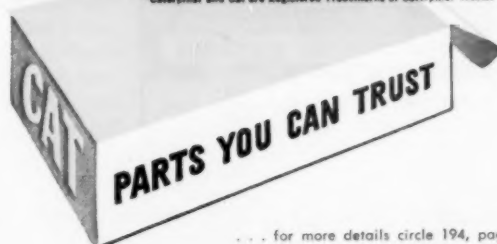
Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



Steel for CAT® rollers is pretested, forged in special Caterpillar owned dies, precision-machined, scientifically heat-treated and carefully inspected. Why settle for anything less?

# CATERPILLAR\*

\*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.



... for more details circle 194, page 16

### On Pecos River Bridge

# Slipforms for 204-ft. Piers

*Forms raised by hydraulic jacks in constructing reinforced concrete shafts. Piers designed and formed in three sections.*

**By G. P. Brown**

Senior Resident Engineer, Texas Highway Department, Del Rio

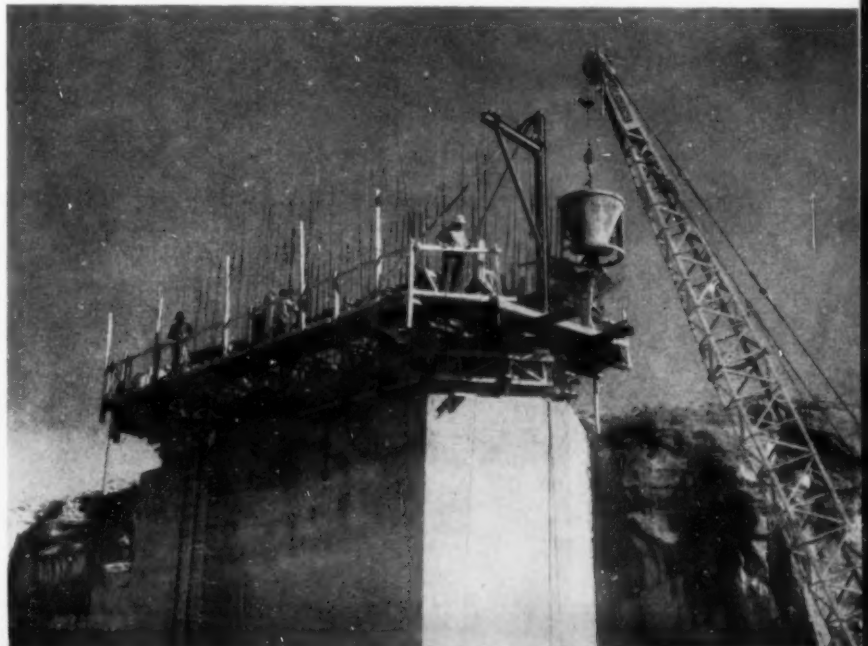
**I**N June of 1954 the 450-ft. steel truss bridge across the Pecos River on U.S. Highway No. 90 in Val Verde County was destroyed by flood. At the bridge site the water reached a depth of 86 ft. Traffic over this route was interrupted for 57 days while a temporary low-water crossing was constructed. Traffic was again stopped for 16 days in July, 1955, while the low water bridge, in turn destroyed by high water, was replaced.

Preliminary investigations were started immediately for a crossing site. The desired location, of necessity, had to eliminate the existing steep grades and sharp turns, and provide a site for a high bridge across the canyon from rim to rim. The Department's bridge division in Austin designed a bridge for the site selected, consisting of a 1,040-ft. continuous deck truss across the canyon proper with spans of 312-416-312 ft. The two intermediate piers for the truss span are in the canyon; each of the piers is 210 ft. in height from bottom of footing to top of cap. A 240-

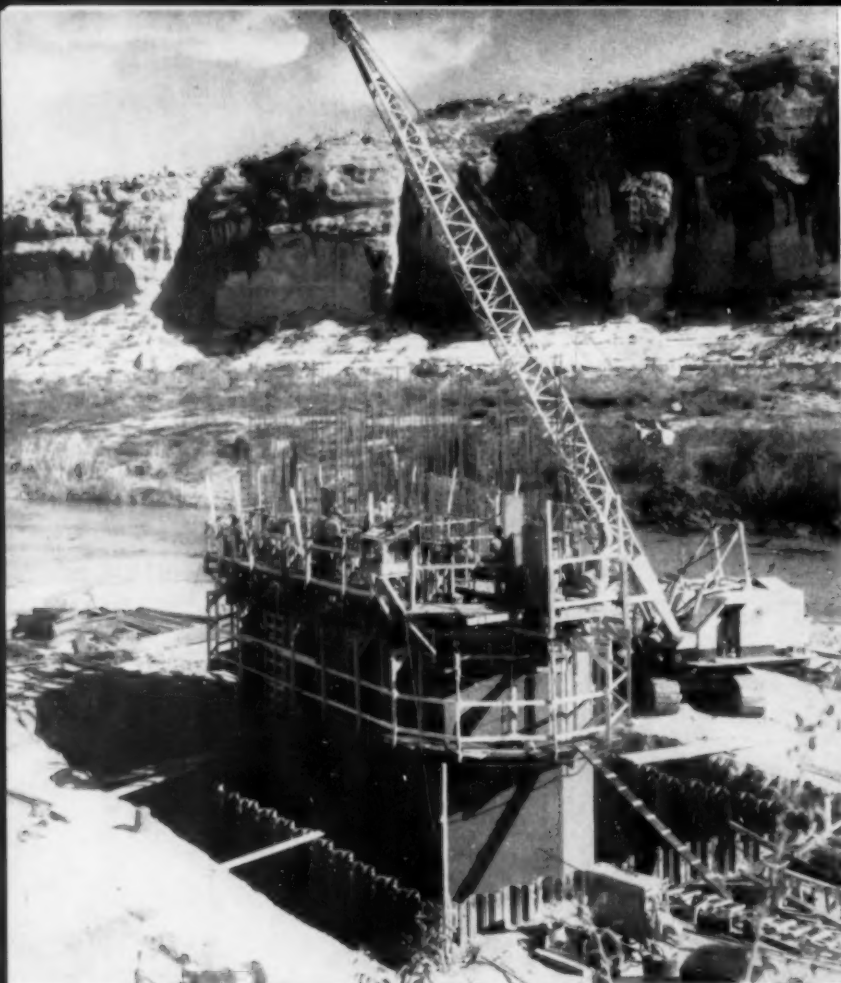
ft. continuous plate girder unit of 2 120-ft. spans is utilized on the west side approach. Between the truss and girder units is a transition bent consisting of a 25-ft. slab span on four rectangular columns. Roadway of structure is 28 ft.; length is 1,310 ft.

Eleven bids were received in September, 1955. The low bid of \$1,269,268.74 from Whittle Contracting Company of Dallas was accepted, with 300 working days allotted to complete the work. Work began October 19, 1955.

The contractor elected to construct



● Beginning slipform job middle section.



● Slipform progress safety railing bottom section. Job well under way.

the tall piers in the canyon using the slipform method. B. M. Heede, Inc., of New York was employed as consultant to design the forms and to furnish an experienced engineer during the construction. This article is written to describe the construction procedure and make-up of the slipforms.

● *Licensed Method.* The B. M. Heede, Inc., firm introduced the hydraulic

jack principle of raising slipforms to the United States late in 1949, through an exclusive license arrangements granted by A. B. Byggforbattring, a Swedish engineering company with world-wide patent coverage of their equipment. Prior to this time, slipform work was accomplished by use of screw jacks, or other similar manual operations which required a team of men to be in constant attendance. This method has not been too satisfac-

tory, as it is difficult to keep the form moving at an even rate of speed and at the same time keeping it level, because of the number of screws or jacks each man has to operate. The hydraulic jack system required only one operator; all jacks operate simultaneously from a central pump when the power is turned on. The hydraulic jack system has been used in the United States on slipform construction of silos and buildings, but this project is the first time it has been used on construction of bridge piers. This is also the first bridge on the Texas Highway system on which slipform method of construction has been used.

The piers are each designed in three sections. The bottom section is pointed both up-stream and downstream and has a steel nose plate on the up-stream end. It is 70 ft. high, 44 ft. long and 15 ft. wide, has three 8x9-ft. hollow cells, 3-ft. minimum walls and 6-ft. depth cap. The middle section is 74 ft. high, 40 ft. long, 12 ft. wide with three 8x8-ft. hollow cells, 2-ft. minimum wall thickness, and there is a 6-ft. depth cap. The top section has two 8x7-ft. rectangular columns spaced 18 ft. apart, 52 ft. in height and an 8x8x32-ft. cap. All concrete is normal Class "A".

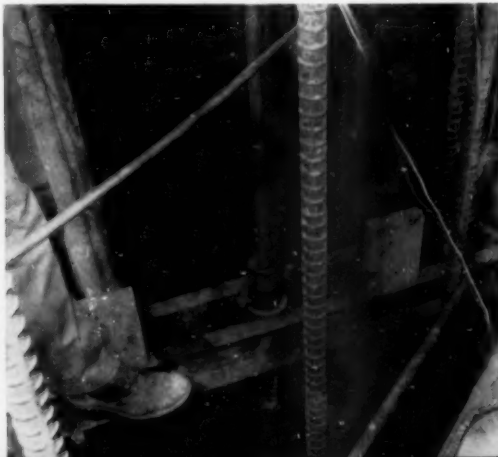
● *Slipform Construction.* The slipform for the bottom section was composed of 48x $\frac{3}{4}$ -in. plywood for the outside and inside walls of the hollow cells. There were 3-ply 2x6-in. walers 12 in. below the top of the form and 2-ply 2x6-in. walers 12 in. above the bottom of the form with 2x4-in. verticals at lifting points and other bracing. The framework from which the forms were suspended was constructed of 5 in. channels.

There were two lines of double channels 50 ft. long at right angles to the highway centerline and eight lines 19 ft. long parallel to the centerline. These double channels were spaced 4 in. apart to accommodate the hy-

● Close-up of hydraulic jack, showing method of installation between the channels.



● Showing position of hydraulic jack in outside wall.



draulic jacks and steel yokes on which the forms were suspended. These double channels were so spaced that the load of the forms was evenly distributed. The longer channels rested on the shorter channels. They were welded where they intersected.

The steel yoke was installed where the channels extended over the outside and inside forms and attached to the bottom of the two-ply waler and held in place by a wooden bracket nailed to the top of the 3-ply waler. The outside and inside 48-in. plywood forms were battered  $\frac{1}{4}$  in. to provide extra width at the bottom to prevent the forms from sticking on the hard concrete. There were 24 hydraulic jacks placed between the double channels. They were located in the center of the outside walls and in the walls between the inside cells and in the pointed section on each end. Outside of the wall forms, a walkway with railing was constructed on top of the channels.

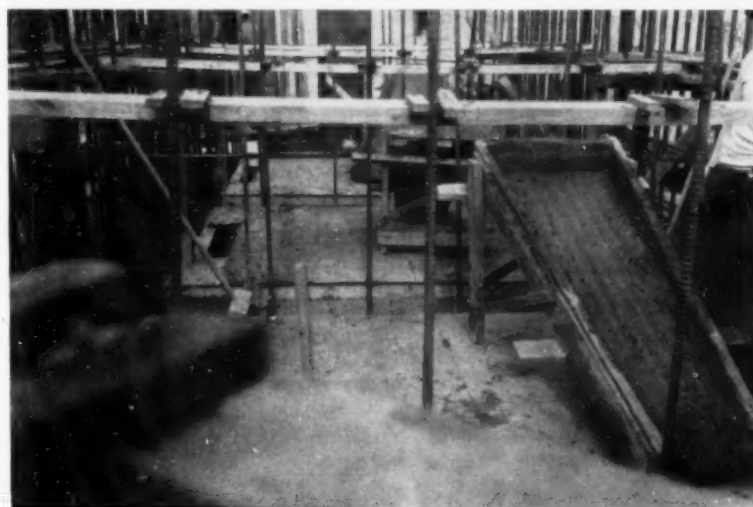
The inside cells were covered with heavy timbers resting on the channels. This furnished a working platform for placing reinforcing steel and concrete. A thin recovery pipe, a little over 1 in. diameter and 48 in. long, was screwed to the bottom of the jacks. This pipe prevented the concrete from adhering to the jack rod and formed a hole in the concrete from which the jack rod could be recovered after the pour was completed.

The jack rod was 1 in. diameter mild steel, each rod averaged 12 ft. long. These rods were screwed together and pushed through the hydraulic jack and the recovery pipe to rest on the concrete footing or cap of the previous pour. All of the hydraulic jacks were connected to a central pump by small tubing. The pump was powered by a  $1\frac{1}{2}$ -hp electric motor.

● *Finishing Scaffold.* A finishing scaffold was attached to the walers on the



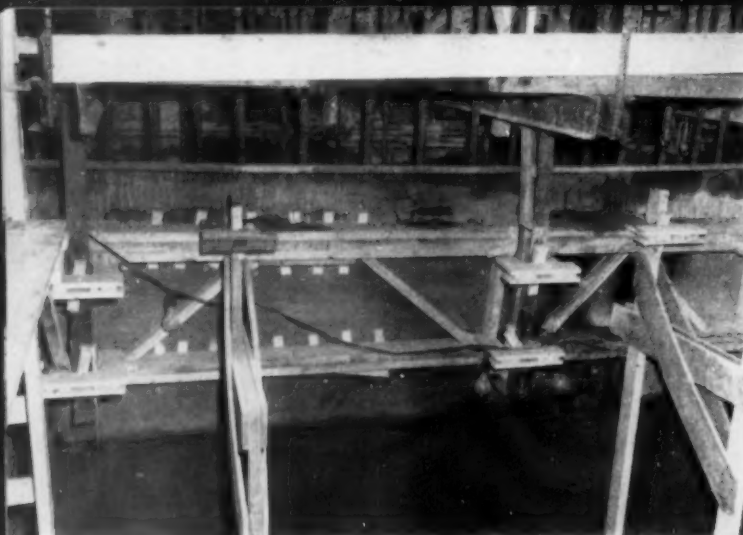
● Central hydraulic pump, powered by  $1\frac{1}{2}$ -hp electric motor. Pressure gauge on front indicates the completion of jacking operation.



● Working platform on top of inside cells.

● (Left): Position of hydraulic jacks in inside wall. (Right): Showing connection of pipe tubing to the jack, and wooden bracket support for reinforcing steel.





● Outside forms showing walers, steel yokes, and connection to double channels.

● Showing finishing scaffold suspended from outside forms.



outside wall forms from which a finisher could work on the exposed concrete as it cleared the bottom of the form. This also provided a platform from which a workman could spray water continuously on the concrete surface for curing. A scaffold also was constructed in the same manner on the inside of the cells for inspection and repairs if necessary.

Wooden brackets were erected between the channels to support and guide the vertical steel. A piece of reinforcing steel also was welded to the channels just above the walls exactly on line of the reinforcing to insure proper spacing from the surface of the wall.

The construction of forms for the middle section were the same as the bottom section but reduced in overall dimensions. The additional hydraulic jacks were placed in the end on which the boom used in hoisting concrete and steel was located. This was done to provide additional support on that end.

● *Top Column Forms.* The forms for the top section provided for the two rectangular columns, with six jacks in each column and two additional in the end where the boom was located. Six jacks were located in the space between the columns. The jack rods were attached to 4x4s with J bolts. The

4x4s were laced together with 1x4 cross bracing and anchored against the concrete columns with 2x6s. This framework, used as a support for the jack rods, extended from the top of cap on the middle section to the underside of the cap on the top section, and also served to some extent as a support for the form work of the top cap. The outside cap form was also attached, as well as the 12-in I-beams which support the cap, so they will be in proper position when the bottom of the cap is reached.

The vertical reinforcing steel was lap-welded to the dowels in the footing or in the cap of a previous pour. The vertical steel varied in lengths from 10 ft. to 20 ft. in 2-ft. increments. This permitted staggered splices and assisted in placing of the other steel as it was then not necessary to add the other bars all at one time. The maximum length of the reinforcing steel was 20 ft. to facilitate handling. All vertical splices were lapped as required by the specifications and welded to prevent slipping.

The horizontal steel was placed at the proper spacing prior to starting the pour and added as the bottom of the channels cleared the next location. Marks were made on the vertical steel at the location of the horizontal bars because during slipform operation the steel in place would be in the fresh concrete and measuring the spacing difficult. Different marks were made for the differences in the steel. The ventilation holes in the piers were formed with metal and placed in the slipforms at the proper location.

● Slipform progress as it reached the natural ground, 20 ft. above footing.



● **How Jacks Operated.** After all the forms were assembled, they were leveled up by pumping each jack individually and the jack rods were marked in 12-in. intervals by making a slight cut with a hacksaw. These marks are essential; as the slipform operation progresses they will be used to check each jack as it reaches the next mark — to see if they are all coming up together and to determine if the forms are level. As the jacks reach this mark and if any are lagging, they can be brought up by shutting off the others and jacking them separately or they may be brought up by a hand pump that was available.

To start the slipform operation, the forms were filled with concrete and when the concrete in the bottom had set up enough, which was determined by sticking a steel rod into the concrete, the jacking started. It usually took from 3 to 4 hours from the time the first concrete was poured in the forms until the jacking started. From 15 in. to 18 in. was considered the minimum amount of hard concrete for jacking safely and if less, jacking was stopped until at least that depth of concrete had set up. To start raising the forms, the valve at the central pump was closed. The switch on the electric motor was then turned on which forced thin lubricating oil into each jack causing the form to be raised at each jack simultaneously. The operator watches the gauge on the pump. While the form is raising the gauge shows 50 psi and when it goes over 100 psi it indicates that the jacking is completed and the switch is turned off.

This operation raised the form 1 in. and usually takes 1½ minutes. The time between raises is governed by

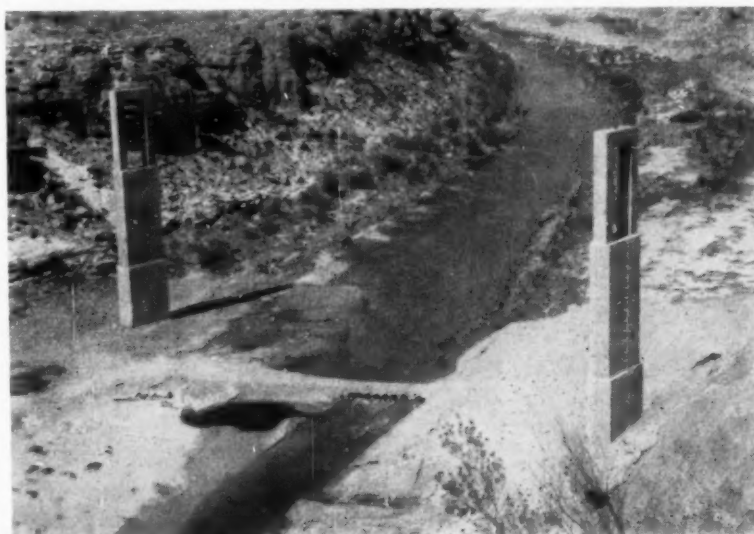
how fast the concrete sets up and varied from 5 in. to 11 in. per hour. Warm water was used in mixing the concrete and it decreased the setting time approximately 20%. The concrete was placed in layers from 2 in. to 4 in. and thoroughly mixed with the concrete previously placed and puddled by hand. A vibrator was not used because if it were pushed too far down it would disturb the concrete that was setting up and might cause the concrete to break out under the form. A slump from 3 in. to 4 in. appeared to work better than a dryer mix.

The excess water seeped down the side of the concrete and aided the forms in slipping and gave a good finish. The contractor piped water up to the forms. A long garden hose was attached to the pipe and this provided water for curing which was done by hand spraying water continuously on the finished concrete.

● **Curing Problems.** A sprinkler hose



● Completion of slipform operation on the middle section.



● Completed piers in Pecos Canyon — 204 ft. above top of footing.



● Steel nose plate held in upright position on upstream end.

attached to the bottom of the scaffold was used for curing the first section pour. This placed the spray directly on the concrete but was not too satisfactory as it cut small grooves in the fresh concrete and wet it in streaks. No curing was done in the inside cells as it was hot inside and very humid. During one pouring operation the temperature on top was 29 deg. F. and 85 deg. F. inside the cells.

On the bottom and middle sections when the bottom of the cap was reached, the inside cell forms were pinned off by driving ½-in. x 18-in. sharpened reinforcing steel pins through the forms just beneath the walers into the concrete, using four pins to a side.

These forms were then released from the channels by removing the steel yokes. Heavy timber joints were then nailed to the 3-ply walers and floored with plywood for forming the bottom of the cap. These forms were left in place. The reinforcing steel in the cap was then placed and slipform operations resumed.

This whole procedure took from one to two hours and there was no construction joint, slipform work continued until the top of the form was approximately 6 in. above the top of cap grade then stopped and chamfer strips nailed to the inside of forms at cap grade and filled with concrete to the chamfer strips.



● Eric Hedeby of Stockholm, Sweden, representative of B. M. Heede, Inc., New York City, consultants on slipform work and owners of the hydraulics jacks used; and Grover Sprott, chief inspector for Texas highway department.

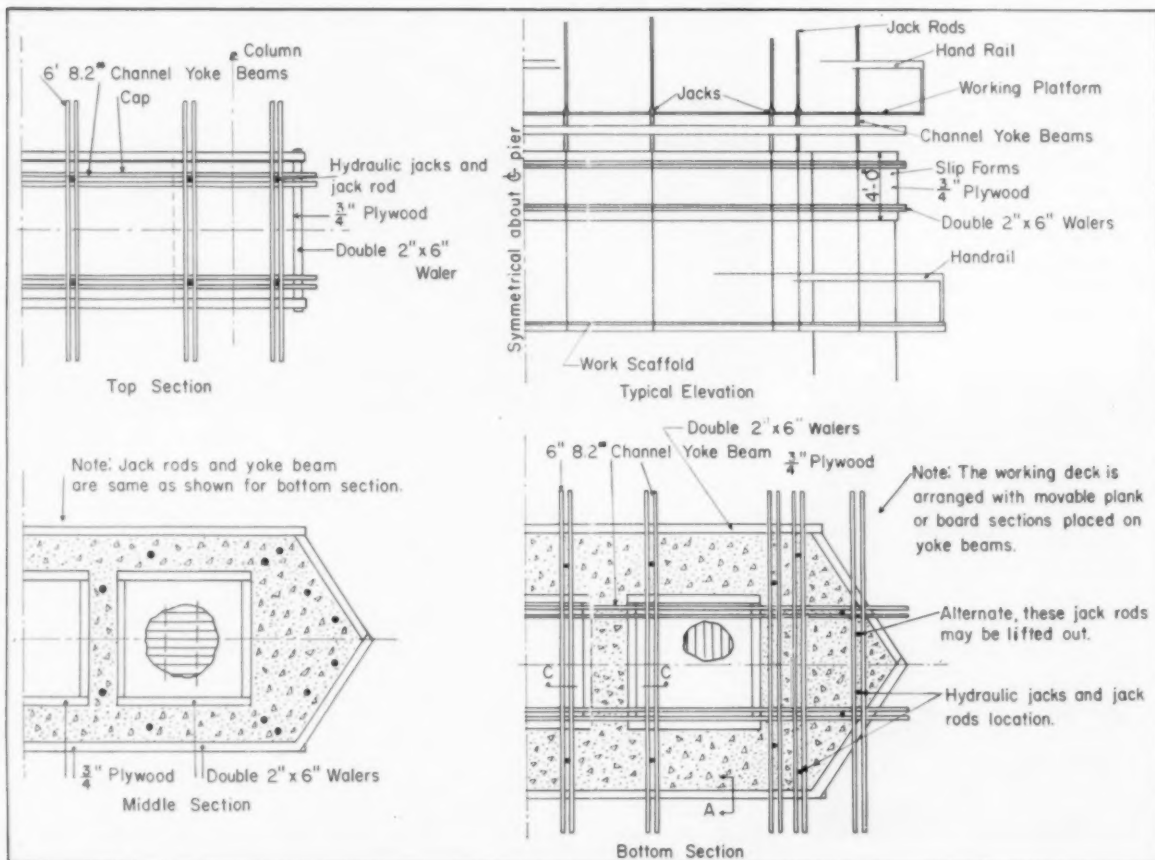
● Completion of slipform operation on top section.

The two rectangular columns of the top section were poured at the same time. Upon reaching the bottom of the cap, the operation stopped and bolts placed through inside forms

for support of the I-beams. Work was stopped approximately 24 hours to allow the bolts to set. These inside forms were removed and a heavy angle iron bolted to the inside of each

column. Seven 12-in. I-beams were welded to them to support the cap and floored with plywood. Operations

(Continued on page 135)



● Plan and elevation details of slipform construction.

## Briefly Noted . . .

Toll roads have continued to stir up their quota of heated debate. The turnpike planners haven't known where things stood with Congress, and how toll projects were going to fit into a 90 per cent federally financed interstate network.

In Michigan the highway department has clashed with the turnpike agency in the newspaper headlines over toll vs. free roads. It is said that the feasibility of some of the toll roads projected might hinge on whether the state highway engineers will be good boys and promise not to put too much improvement on competing free routes. There is a comic opera note to such goings on.

And out in Kansas and Oklahoma the feasibility studies have been discouraging for extensions planned to the present turnpikes in the respective states.

It is apparent that "traffic corridor" is the magic word for toll road builders. The one in New Jersey is so well defined that the Jersey Turnpike has paid off brilliantly. The corridors have been less clearly defined for the New York Thruway and the Ohio Turnpike. Truckers there have been slower than expected in their swing over to toll road patronage.

In the case of the Ohio and New York roads, the outlook is sure to improve steadily as toll road, bridge and tunnel connecting links are completed to forge an integrated eastern network. That, plus continued general traffic growth and discovery by the truckers, one by one, that toll roads can save them money over less mod-

ern alternate routes. The truck patronage on the Thruway, we understand, has been inching upward steadily. We predict that within a year or two both turnpikes will have much heavier truck patronage.

Not so bright is the turnpike outlook out in the wheat belt, where traffic is naturally dispersed over a scattered gridiron. New feasibility studies are being made in Oklahoma, following adverse reports.

Feasibility techniques, need studies, call them what you will, we hope that these vital yardsticks will not be lost sight of in Congress when an accelerated construction job is voted for the interstate network. Some parts of the 40,000 mile interstate system do not justify fancy construction, and won't for a while.

Other segments in city environs will take tens of millions of dollars a mile. A continuing inventory of need is the most important single tool of the long range planning that has become so essential to the road program.

In the past thirty years we venture that no other form of public works expenditure or other governmental activity has been so clean as that of rural highway work under the Federal-aid highway administration, as vested by Congress in the Bureau of Public Roads and the state highway departments.

That is why, when a bad apple does seem to pop up in the basket, the publicity is all the more deplorable. None of us of course have access to the facts behind the head-

lines in the Chicago Tribune recently, announcing a federal probe into paving deals in Illinois. What we do know is that sixty firms have been subpoenaed, and that according to the report the U. S. Department of Justice has spent a year looking into possible violations of the anti-trust laws "in connection with graft payments and collusion between state officials and employees, labor unions or their representatives, or trade association representatives."

The investigation is based on the ground that there is interstate traffic involved in the transportation of materials used in the construction. A study of records is intended on all contracts in Illinois on road paving with asphalt and concrete as well as airport landing strips and road resurfacing jobs. The subpoena has ordered company records to be produced for a grand jury meeting in Danville.

Such front-page publicity couldn't have come at a worse time than it did, when Congress was about to pass — or possibly again put off — a vast new highway program. The large and growing highway job entails staggering problems of administration. But no one element is so important as that of confidence in the integrity of the top-level highway management within the individual states, through the governors and mayors elected by the public.

An educated guess is two guesses averaged by a man who knows what's what.

**IT COSTS LESS TO BUILD GOOD ROADS THAN TO HAVE POOR ROADS**

**CAT\* DW21 - NO. 470**

**LOWBOWL**

**SCRAPER**

**OUTLOADS COMPETITION  
IN ON-THE-JOB TESTS  
ON KANSAS TURNPIKE**

**1. TESTS WERE MADE** on contractors' jobs on the Kansas Turnpike. They covered a period of three weeks. For each comparison, the competing units were loaded under similar conditions. Soil density tests were performed right in the loading area to provide an accurate measure of scraper load in pay yards.



**3. JOB STUDIES** showed that the new turbocharged 300 HP DW21 Tractor had the "go" to equal or beat other units in cycle time while carrying more pay yards. Other features contributing to this unit's success were large 29.5-29 tires, an efficient power train, synchro-safe brakes and the fast, responsive No. 27 Cable Control.



**2. FIELD ENGINEERS** weighed load after load as the competing units passed over a portable platform scale. By subtracting average empty weight from average gross weight, they determined average net load weight. In every test, the No. 470 Scraper with exclusive Caterpillar Lowbowl design consistently carried larger payloads.



**4. LOWBOWL DESIGN**, developed by Caterpillar, is a feature of the No. 470 Scraper. With this new concept, the bowl has been widened and lengthened, yet its depth has been decreased. But Lowbowl design is more than just dimensional changes. As the tests show, material is loaded with less resistance clear out to the end of the loading cycle.



# TEST RESULTS

**No. 470 Lowbowl Scraper (18 cu. yd. struck capacity) vs Competition**

## No. 470

AVERAGE  
LOAD

**18.1**

BANK CU. YD.

## Scraper A

18 cu. yd. struck capacity

AVERAGE LOAD

**14.8**

BANK CU. YD.

## No. 470

AVERAGE  
LOAD

**18.1**

BANK CU. YD.

## Scraper B

Sideboarded —  
18 cu. yd. struck capacity

AVERAGE LOAD

**14.3**

BANK CU. YD.

### LOWBOWL ADVANTAGE:

**3.3 bank cu. yd. per load**

**Test conditions:** Damp silty clay—density: 3300 pounds/cu. yd.  
**Weight comparisons:** Average net load, pounds: No. 470—59,840; Scraper A—48,675.

**Comments:** On one load, the operator of Scraper A was asked to obtain maximum heap. It took 2.40 minutes of push loading to pick up a load which weighed 58,875 net pounds—less than the average load carried by the No. 470!

### LOWBOWL ADVANTAGE:

**3.8 bank cu. yd. per load**

**Test conditions:** Sandy clay. Density: 3100 pounds/cu. yd.  
**Weight comparisons:** Average net load, pounds: No. 470—56,225; Scraper B—44,400.

**Comments:** Average loading time for both machines was comparable. In total cycle time, the DW21 had the advantage. Its transmission provided a better match to rimpull requirements, and its shorter turns saved time on the fill.

## No. 470

AVERAGE  
LOAD

**18.1**

BANK CU. YD.

## Scraper C

18 cu. yd. struck capacity

AVERAGE LOAD

**14.3**

BANK CU. YD.

## No. 470

AVERAGE  
LOAD

**15.6**

BANK CU. YD.

## Scraper D

Sideboarded —  
18 cu. yd. struck capacity

AVERAGE LOAD

**13.3**

BANK CU. YD.

### LOWBOWL ADVANTAGE:

**3.8 bank cu. yd. per load**

**Test conditions:** Damp silty clay. Density: 3300 pounds/cu. yd.  
**Weight comparisons:** Average net load, pounds: No. 470—59,840; Scraper C—47,290.

**Comments:** Scraper C, like Scraper A and the No. 470, has a rated capacity of 18 cu. yd. struck. On the job, where results, not rated capacities, are the true yardstick of a machine's ability, the No. 470 Scraper with Lowbowl design decisively outloaded the other two.

### LOWBOWL ADVANTAGE:

**2.3 bank cu. yd. per load**

**Test conditions:** Heavy clay. Swell about 40%. Density: 3440 pounds/cu. yd. **Weight comparisons:** Average net load, pounds: No. 470—83,550; Scraper D—45,630.

**Comments:** In the tests, Scraper D scored next best to the No. 470. Scraper D is the "old" DW21-No. 21, a unit that set records for high production at low cost the world over. Now, in the new DW21-No. 470, Caterpillar has produced a unit that's even better—and way ahead of competition!

**Results on the job, not rated capacities,** are the only true measure of a machine's ability to produce. Check the results here and judge for yourself how much the *extra yards* moved by the DW21-No. 470 Lowbowl Scraper can mean *profit-wise* to you!

Your Caterpillar Dealer has a complete report of this on-the-job test on the Kansas Turnpike—as well as similar reports from other sections of the country. Ask him to show you the advantages of Lowbowl Scrapers on your job.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

... for more details circle 191, page 16

# CATERPILLAR\*

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**BIGGER, FASTER LOADS  
WITH LOWBOWL SCRAPERS**

# Roads and Streets in the News

## Legislative Pot is Simmering

### California

Governor Knight declared he was opposed to any increase in the state gasoline tax at the 1956 budget session of the California legislature. Bills introduced included a proposal to boost the tax from 6 to 6.4 cents per gallon.

### Kentucky

A bill submitting to Kentucky voters at the November general election a \$100,000,000 bond issue to provide matching funds for federal-aid highway grants, was given final passage by the State legislature. The measure, as advocated by Governor Chandler, would pledge the "full faith and credit" of the state for 30 years to retire the bonds.

Also given final approval was a bill imposing a 2-cent-a-gallon surtax on motor fuels used by 4-axle heavy trucks using the state's highways.

The Kentucky lawmakers also enacted a measure giving new and more direct controls over rural roads. It will allow the State Division of Highways to build rural roads to any standards, then leave them to the counties to maintain. Kentucky law heretofore has required the state to maintain every rural road it built.

### Massachusetts

Although strong support for Governor Herter's proposed \$200,000,000 highway bond issue was expressed by business, civic and labor leaders at a hearing, the measure was expected to

run into much the same partisan opposition that killed a similar proposal in the 1955 legislature.

The current proposal differs from that of a year ago, in that the governor this year recommended that either the gasoline tax be boosted by 1 cent to finance the bonds, or that the state tax on heavy trucks be raised and the gas tax increased by ½ cent. Herter's administration estimated \$50,000,000 of the total could be carried without any increase in taxes.

Massachusetts during the past seven years has authorized a total of \$575,000,000 in highway bond issues under the administrations of Herter and former Democratic Governor Dever.

Although the legislature last year rejected Herter's proposal for a \$150,000,000 highway bond issue, which was reduced in amount to \$125,000,000 before coming up for a final vote, the lawmakers did approve a \$25,000,000 highway bond issue for emergency flood repairs.

### Minnesota

Adoption of a compromise formula for distribution of state highway funds among cities was proposed to a state legislative interim study commission. Under a proposed state constitutional amendment being submitted to the electorate in November, 9 per cent of state gasoline and motor vehicle tax receipts would be distributed to cities and villages over 5000. It will be up to the legislature, however, to decide the formula for the allocations.

### Nebraska

State Engineer L. N. Ress announced that the Nebraska Highway Department hired the J. E. Greiner Co., Baltimore engineering firm, to pin down a route for a four-lane interstate highway between Omaha and Lincoln. The consultants' recommendations, expected within 90 days, will be subject to department approval and bureau okay.

Following this study, Ress added, Nebraska consulting engineers will be retained to make detailed surveys and draw construction plans for certain segments of the road. It is hoped to start construction later this year on the first leg of the route, which ultimately will extend to the Wyoming line.

### New York

A measure providing for a November referendum on a \$500,000,000 highway bond issue was given final passage by the New York legislature. Rejected by the Republican-controlled legislature, however, was Governor Harriman's request that motor fuel taxes be increased to repay the bonds. In line with recommendations of a study commission, the governor had advocated increasing the state gasoline tax from 4 to 5 cents a gallon and the diesel fuel tax from 6 to 7½ cents.

New York voters last fall rejected a proposed \$750,000,000 highway bond issue which would have been accompanied by a 2-cent gasoline tax and a 3-cent boost in the diesel fuel levy.

Bills enacted by the 1956 session included a measure increasing state aid for town highway maintenance by \$3,300,000 a year. Also a bill increasing the town highway maintenance spending ceiling from \$7,000 to \$9,000 per mile a year.

Rejected by the New York solons was a bill to replace the state's weight-distance tax against heavy trucks with higher registration fees and a special tax on fuel.

### Rhode Island

A bill authorizing a November referendum on a city of Providence bond issue of \$1,000,000 for streets and highways was enacted by the Rhode Island legislature.

### Kansas turnpike speeded

Construction on the Kansas Turnpike was reported as 35.5 per cent complete by March 1 when construc-

### South Carolina Must "Revamp Entire System"

A report by the South Carolina State Fiscal Survey Commission declared that South Carolina will need to "rebuild and modernize virtually its entire primary highway system" within the next 10 years. The commission estimated such improvements will cost \$480,000,000, or more than the total of all state expenditures for highways in the past.

Predicting that automobile registrations, now 750,000, will rise to 1,000,000 by 1956 in the state, the commission recommended that the highway modernization program be undertaken to meet this increase and the already "overcrowded conditions" on present highways.

The politically-minded commission advocated, however, that "future construction be geared to revenues received from existing taxes and federal-aid funds, and that the maximum construction program be carried out without the addition of any other taxes."

The commission in its report to the state legislature recommends that a highway department personnel director be hired and a new personnel system, with higher pay scales, be established.

tion workers started back to their jobs after a winter lull. When the program was outlined two years ago, plans called for the project to be 58.2 per cent complete by March 1 of this year.

Turnpike General Manager Gale Moss predicted, however, that the lag would disappear quickly this spring and that the scheduled completion by next October would be met. In another development, Moss disclosed that the authority is exploring the possibility of constructing a north-south toll highway in eastern Kansas.

### Kentucky turnpike opening

Originally scheduled for completion by last Dec. 31, the Kentucky Turnpike now is not expected to be ready for opening until July 4, 1956. Inclement weather last year was among the reasons for the delay on the project. The \$38,500,000 turnpike runs 38.5 miles from Louisville to Elizabethtown.

### Westchester authority progress

Bills creating a Westchester County Parkway Authority, to carry out a \$65,000,000 program of modernizing toll parkways, were given final passage by the New York legislature and sent to Governor Harriman, who was expected to sign them. Borrowing by the nine-member bipartisan authority will be limited to \$65,000,000 and tolls will be limited to 25 cents.

### Link in New Jersey Turnpike dedicated

The first 3½-mile section of the \$118 million extension of the New Jersey Turnpike over Newark Bay into Hudson County, was opened in April. With the completion of the remaining 4½ miles northward during the 1956 summer, this project is expected to bring dramatic time-saving and improved safety to motorists and truckers. When completed this summer, the highway will link the Newark and Newark Airport area across Newark Bay through Bayonne to the entrance to the Holland Tunnel leading into New York City — 6 lanes, non-stop all the way.

The full 8-mile segment, despite its short length, is expected to attract 15 million vehicles during the first full year of operation, 1957, with about 27% of this traffic coming to or from the Holland Tunnel.

The full 8-mile project includes one of the major bridges of the Eastern U. S., the 9,560-ft. Newark Bay bridge. The work will have required

6 million cu. yd. of earthwork, 70,000 ft. of drainage pipe, 320,000 sq. yd. of pavement, principally concrete, 114,000 lin. ft. of curbing, 1,655,000 ft. of piling, 314,000 cu. yd. of concrete, 19,370 tons of reinforcing steel and 73,000 tons of structural steel.

The project is part of the recent program of widening and extending the New Jersey Turnpike for which Charles M. Noble is chief engineer and Howard, Needles, Tammen & Bergendoff, general consultants.

### \$320 million highways in Chicago program

A five-year public works program for Chicago totaling \$675 million, recently recommended to Mayor Daley by the city's engineering review board, includes \$320,750,000 for highways — the largest item. Drawn up by a staff headed by street commissioner Lloyd M. Johnson, the program also includes \$36,110,000 for airports and \$22,500,000 for parking facilities.

The remainder would go for sewers, subways, parks etc.

The detailed highway and street program includes construction or reconstruction of 200 miles of arterial streets; 294 lineal miles of street lighting, and lighting of 75 miles of residential areas; 1,100 new traffic signals and modernization of 766 others; and a \$300,000 general traffic study. Bridges projects involved take in nearly a score of major bridges and grade separations.

Sixty miles of street widening is also contemplated, along with 39 through-lane overpasses and 61 grade separations on the present arterial "preferential" streets.

Completion of the Congress Street and other expressways and the \$88 million elevated Calumet Skyway are on the program. About ten per cent of the funds would come from new corporate bonds, bringing the city's bonded debt up to \$327 million. Revenue bonds, toll bonds, state motor fuel taxes and other sources are also involved.

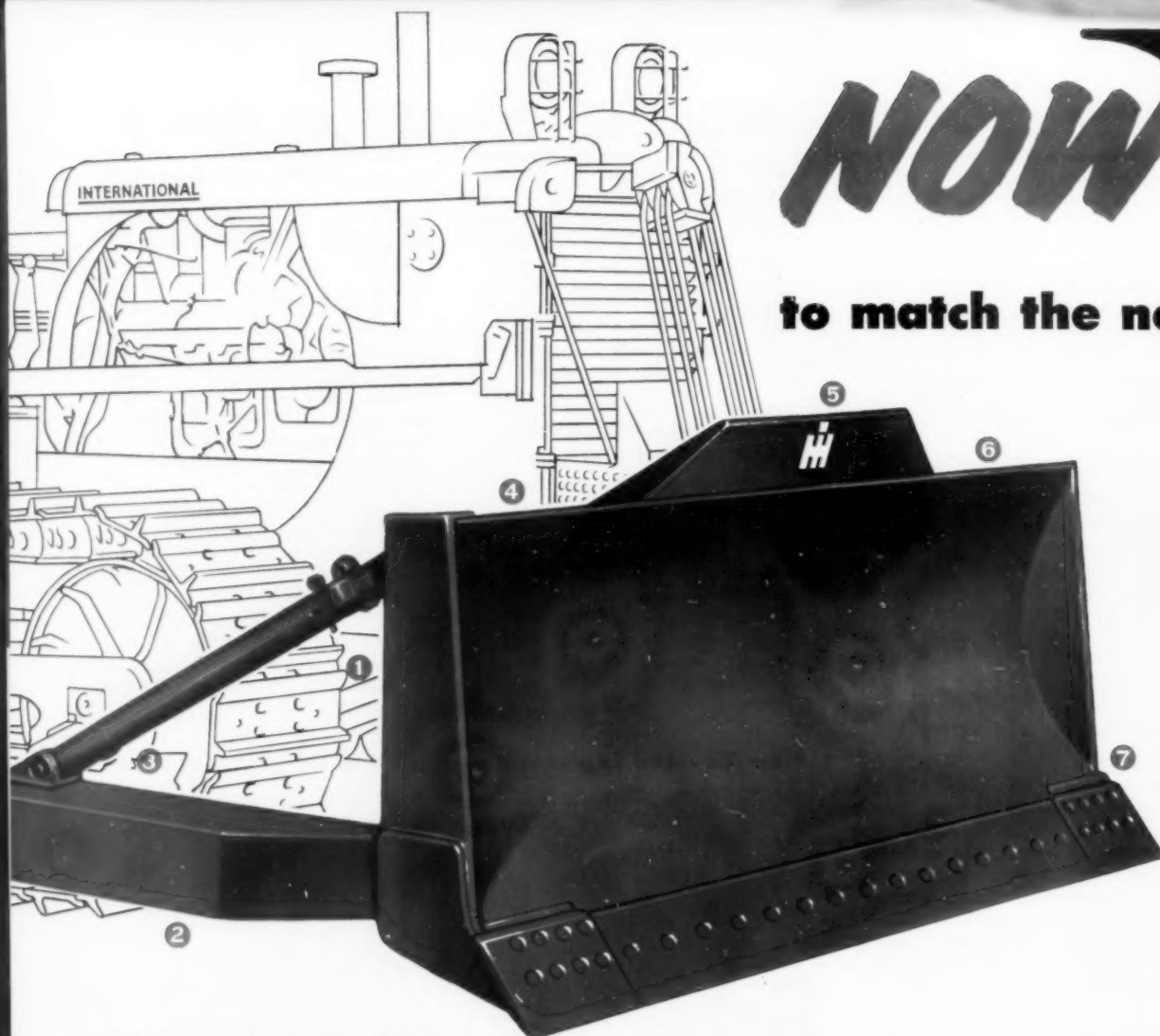
### New Elevated Expressway — Can You Guess What City?



● Chicago? Wrong! Cleveland or Boston or Baltimore? No — it's Tokyo, Japan's bursting metropolis has traffic problems, too, and to help relieve congestion is constructing a multi-laned elevated freeway atop an old canal bed that traverses the downtown area. The filled-in space underneath the structure will be available for parking. (Wide World Photo).

# NOW.

## to match the new



- ① Side plates are of abrasion resistant high strength steel, securely fused to moldboard and box sections by low-hydrogen welding. They prevent load spillage, allow you to carry larger loads. Standard on all International bulldozer blades.
- ② Push arms are sturdily constructed of box sections. Side plates are mill-rolled with integral back-up bars to support top and bottom plates. Machine welding guarantees uniformity of weld.
- ③ Headless pins, locked by eye bolts, secure struts to blade. For removal, pins can be driven out in either direction. On hydraulic blades, all control linkage is connected to the blade through self-aligning bearings.
- ④ Entire perimeter of blade is backed by heavy box channels solidly fused to moldboard. With this type of construction

moldboard, box channels, and welds flex freely to prevent weld failure.

- ⑤ Spillboard is wide and high to prevent spillage over top of blade. Note that it is curved to match the contour of the moldboard, thus aiding boilling action. Width of moldboard allows you to carry full load for which the blade was intended.
- ⑥ Moldboard is formed from a single sheet of low-alloy, high-strength steel. International blade is shaped to perfect curvature in a special forming machine to assure uniform strength and stress resistance over entire area.
- ⑦ Shear bars welded to moldboard support end bits and relieve stress on end bit bolts. Lower edge of end plate is reinforced by wear plate to add strength at corners, increase wear resistance.

## New blades designed from "ground" up

To make full use of the greater work capacity of the new Bonus-Powered International crawler tractors, we now offer a complete line of newly designed blades matched to tractor power.

These new blades are rigidly supported around the edges by box sections to give the blade strength but also permit the moldboard to "breathe" under load stresses. New automatic welding processes guarantee that the welds in International blades will hold up under *any kind of job conditions*.

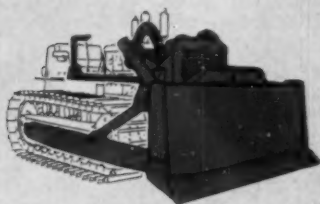
International blades will last far longer and give you far less trouble than any others you have ever hung on any tractor. When you inquire about the new line of Bonus-Powered Inter-

national crawler tractors, ask your International Industrial Power Distributor for all the facts about the new line of matching blades. See for yourself that they are the best designed, best constructed on the market.

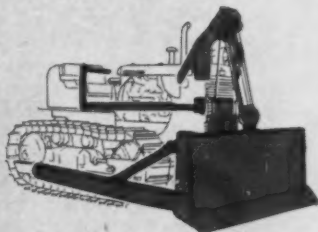
**Write For New Blade Literature:** An illustrated specification list of the 228 attachments available for International crawler tractors is just off the presses. For your free copy of Mailing Folder CR-492-F, write Consumer Relations Department, International Harvester Company, 180 North Michigan Avenue, Chicago 1, Illinois. No obligation, of course.

# .42 new blades

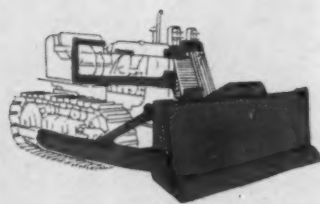
## Bonus-Powered International crawlers



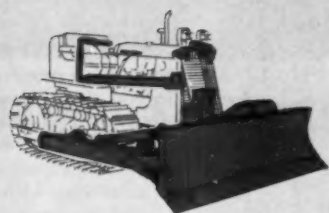
**Direct Lift Hydraulic Bulldozer**  
Operates off front-mounted, gear-driven pump which gives fast blade action. Self-aligning bearings prevent binding of linkage.



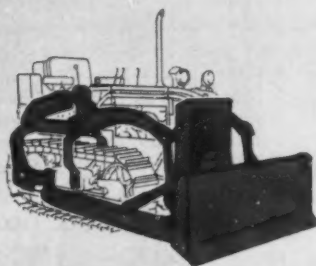
**High-Gantry Cable Bulldozer**  
Operates off either front or rear-mounted International cable control unit. Available for TD-24, TD-18, and TD-14 tractors.



**Low-Gantry Cable Bulldozer**  
Operates off either front or rear-mounted International cable control units. Available for TD-24, TD-18, and TD-14 tractors.



**Hydraulic or Cable Bullgrader**  
Operates off high or low gantry, front or rear cable controls on TD-24, TD-18, and TD-14 tractors. Hydraulic bullgrader also for TD-9, TD-6, and T-6 tractors.



**Track Frame Mounted Bulldozer**—Distributes the load evenly over the length of the tracks. Available only for TD-9, TD-6, and T-6 tractors. Bullgrader also available.



**International Drott "4-in-1"**  
Newest of International Drott loaders. Combines Skid-Shovel, Bullclam, clamshell, and bulldozer in one unit. Available for TD-14, TD-9, and TD-6 tractors.



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A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors... Self-Propelled Scrapers and Bottom-Dumps... Tractor and Rubber-Tired Loaders... Diesel and Carbureted Engines

# Work Begins Soon on AASHO Test Road

Electronic computers and new testing instruments to aid researchers on \$12 million project, which will require two seasons to construct.

**D**ETAILED plans for launching of the largest highway research project ever envisioned were outlined in Chicago recently at the annual meeting of the Mississippi Valley highway officials.

Fred Burggraf, director of the Highway Research Board, told the engineers that ground-breaking for construction of a \$12-million test road near Ottawa, Illinois, will take place soon. The specially constructed road will be the site for traffic experiments designed to reveal the effect of various truck weights on highway pavements and bridges.

Highway officials, transportation economists, and legislators who have long debated how sturdily roads must be built to accommodate highway transport, expect to find some of the answers in the Illinois test. Findings will become the basis for future design, and, probably, taxation of the trucking industry.

(Federal legislation is now pending

in Congress which would require state legislatures to "freeze" truck sizes and weights at present levels or AASHO recommendations until results come in from the Illinois test. The Congressmen also want to know how much higher roadbuilding costs are for facilities to carry the heavier vehicles.)

The big test road will consist of 8 miles of 4-lane divided pavement, to be constructed as part of a relocation of US 6. Four test loops each approximately 7,600 ft. in length, will be provided by connecting the divided roadway with turn-arounds. Each loop will have two test lanes with concrete pavement on one side of the dividing strip and bituminous pavement on the other side. Each loop will be divided into sections, with pavement varying in thickness to represent existing roads and possible future design requirements. There will be similar variations in the paired test lanes of each loop. Eight bridges of varied design and construction are also in the tests.

Some 48 truck-tractor semi-trailers will be used as test vehicles. They will apply more than one million axle loads to each of the test sections over the two-year period of the research project. Loads will vary from 10,000 to 30,000 lb. single axle and 20,000 to 50,000 lb. tandem-axle. Single-axle loads will be applied on the inside lanes, tandem axles on outside lanes.

Two seasons will be required to construct the highway and install the various electronic and mechanical instruments to record the effects of repeated loadings. After two years of testing, another year will be required for post-testing and analysis of results.

This project is being financed cooperatively by all the state highway departments (except one), the Bureau of Public Roads, Department of Defense, Automobile Manufacturers Association and other allied sectors of industry.

High speed electronic computers will be used to keep the analysis of the test data up-to-date and to make possible interim findings of value to highway construction programs.

## New Techniques

Unique to this experiment will be the application of advanced statistical methods to the project. Another interesting feature will be the development of new and far more efficient instrumentation measuring traffic effects.

A group of 20 outstanding engineers specializing in materials, soils and structural research were called upon last year to answer the question: "What should be measured on the AASHO Road Test?" They have formulated a program of tests and measurements that would yield the most useful information from the project. Another group of 23 research engineers and specialists in the field of instrumentation have the task of determining how to measure the factors desired.

A 32-man Advisory Committee will guide the project. Twelve members represent state highway departments; four represent the AASHO; three are from engineering colleges. The rest represent industry groups, highway users, and the BPR.

At this stage, construction plans are nearing completion. Design is in progress for the four bridges which will carry cross traffic over the test road and the single bridge which will span a small stream.

## Aluminum poles to save upkeep on bridge



- The new three-mile Tappan Zee Bridge spanning the Hudson River is one of the last links in the 427-mile New York Thruway. To eliminate light pole maintenance on the structure, thruway authority installed 220 Hapco tapered aluminum alloy lighting standards. Thirty-five special aluminum lighting brackets, also manufactured by Hubbard Aluminum Products Company, were mounted on the structural work of the middle span. The poles and brackets are corrosion resistant and require no painting. The newest link in the New York system is the most concentrated, over-the-water lighting installation in the world.

**the Model D**  
does the job—  
at low cost



## **“Never lets me down”**

**says Everett Datton, San Antonio, Texas,  
about the Allis-Chalmers Model D Motor Grader.**

It's two homes a day, out Texas way—as Quincy Lee Construction Company works on a big-scale project of building 1400 new homes in two years.

One of the machines on the job is an Allis-Chalmers Model D motor grader used to grade roads, landscape homes and build driveways. Owner Quincy Lee says this about his Model D: “I'm very happy with it. It does a very fine job for us.” Operator Everett Datton says,

“I like the Model D. It gets in and out of tight spots, especially where buildings are close together. With the D's fine

control I can work between newly-planted trees and close to sidewalks without damaging trees or chipping cement. Not only is this machine good at fine grading, but its diesel engine has plenty of power for handling full capacity loads. I run it 9 hours a day, 5½ days a week. *She never lets me down.*”

• • •

Quincy Lee and Everett Datton are confirming what thousands of other Model D operators and owners know. In its class, you just can't beat the D for sure-fire performance at low cost. Watch it in

action and you'll be amazed how the D's right combination of weight, power and traction lets it handle a wide range of jobs. And you can choose either diesel or gasoline engine models, plus number of attachments—including rear-mounted ¾-yd loader and midship-mounted hydraulic scarifier, to increase the Model D's usefulness and efficiency.

See the Model D now at your Allis-Chalmers construction machinery dealer—headquarters for factory-trained servicemen, factory-approved facilities and True Original Parts.

**Model D**  
50 belt hp  
diesel or gasoline  
engine

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ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

# **ALLIS-CHALMERS**



# Built to take the shock of rock!

**Gar Wood  
-St. Paul-**



## Strong-Arm Hoists and Bodies

**LOAD OUT BIGGER LEGAL PAYLOADS** with Gar Wood-St. Paul equipment. Rugged body design to take the shocks of shovel loading in rock . . . stress tested to put the strength where it's needed, eliminating excess weight. Body sides, corner posts and full-width rear apron are integrally tied into steel sub-structure.

**DUMP FASTER WITH GREATER SAFETY** regardless of load distribution. Massive torque tube converts thrust of twin-cylinder Strong-Arm hoist to equal lifting power on both sides of dump body. No one-sided dumping strain . . . greater stability on rough grades. Triple-laminated pump runs smoother, delivers dependable, trouble-free power.

**CUT MAINTENANCE TIME AND COSTS** by standardizing on Gar Wood-St. Paul equipment. Strong-Arm hoists are the world's easiest to maintain. You can make necessary repairs with ordinary truck tools! Exclusive tie-rod cylinder design speeds up inspection, maintenance or repair of cylinder, reduces replacement costs. Hydraulic pump is precision-machined for easier field servicing.

**CALL YOUR GAR WOOD-ST. PAUL DISTRIBUTOR** for specifications of the most complete, most advanced line of truck equipment on the market. Or, write to Customer Service Dept., Gar Wood Industries, Inc., Wayne, Michigan.

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Gar Wood  
Excavators

. . . for more details circle 216, page 16



● Workmen make ready to bolt another section of Armco bin wall together as earth compaction continues.

CALIFORNIA'S most spectacular seacoast highway, sliding 300 ft. down into the Pacific Ocean at three locations near Big Sur, California, is being saved by drastic retaining wall measures. Heavy Armco bin-type retaining walls, up to 25.3 ft. high and 90, 100, and 140 ft. long, are being placed at strategic locations where failures have occurred. Believed to be one of the biggest jobs of its kind done in recent years along the west coast, the \$86,000 retaining wall contract is expected to cure three bad trouble spots along the scenic highway.

N. M. Saliba, construction firm from Gardena, California, is pushing the project. Work is being administered from the San Luis Obispo district office of the California division of highways. Started October 28, 1955, the job was scheduled for January 10 completion despite some delay in arrival of all the retaining wall material.

Construction of the three sizeable retaining walls highlights what has long been a never-ending maintenance job. There was a time when the Pacific Coast between Monterey and Morro Bay lay idle and deserted, its shoreline beauty accessible only to sea voyagers and to a few hardy souls who packed into the area on horseback. When the late William Randolph Hearst purchased a 100,000-acre castle there, the need for highway access became urgent. Over a

period of many years, the spectacular, winding highway which hugs the seacoast, sometimes as high as 500 ft. directly above the pounding surf, was constructed. Even then the need for some kind of retaining wall was evident. Rubble masonry and redwood cribbing were erected by prison, WPA, and contract labor. Part of Saliba's contract prior to erecting the bin walls, was the removal of sections of these old retaining walls.

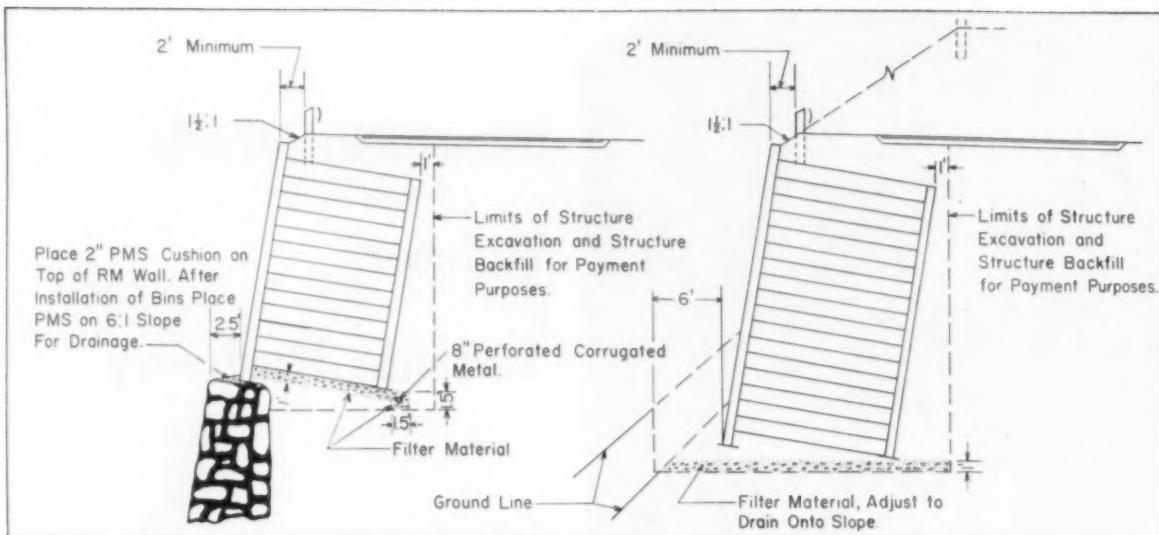
The highway at slide locations is a 20-ft. bituminous mat, cut in most cases in a bench high above the sea. The failures which have occurred have been typical. They consist of slide-type breaches where chunks of the highway berm — especially in fill sections — have broken away and slid down toward the sea in wet weather. Each of the three bin-type retaining walls is being erected on the seaward side of the highway. As

- The type of slide failure which occurred is dramatically shown here. The softened bench simply slid toward the sea.



## Steel Bin Walls Bolster Seaside Highway

*California's spectacular Route 1 along the ocean has been repaired to cure slip-outs. Metal walls solved problem of replacing old-stone and redwood walls built in WPA days.*



● Two typical cross sections of bin wall designs shown in relation to the highway.

such, these walls are expected to sustain an indefinitely high surcharge for many years to come.

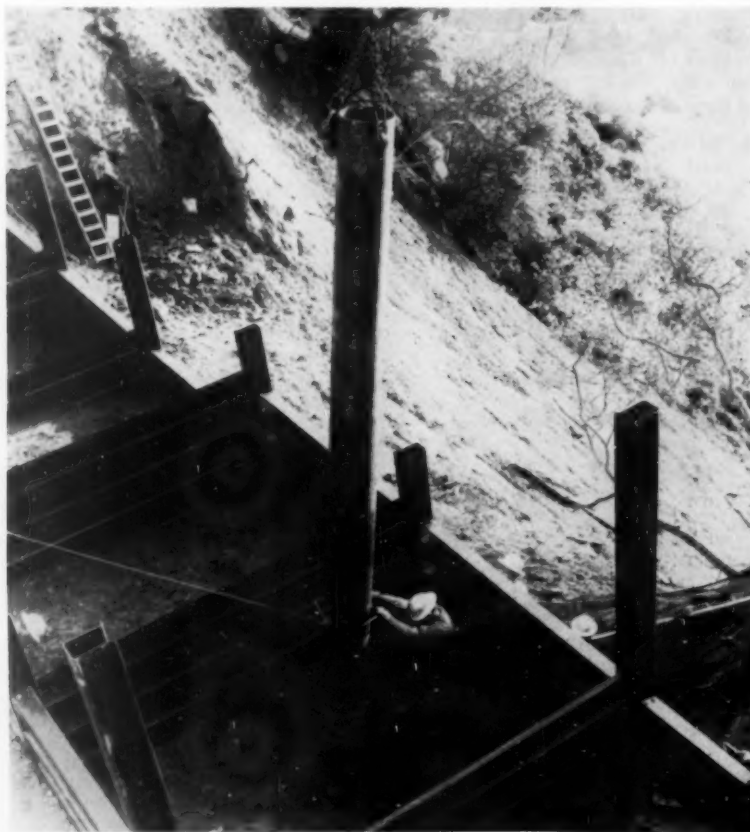
Construction plans called for the contractor to open up each location with the necessary excavation, and to remove old redwood cribbing and rubble masonry. So there will be adequate drainage under the new retaining walls, 12 in. of crushed-rock filter material was placed at each location.

One section of the wall rests on impervious rubble masonry constructed many years ago. Here a drainage pattern for the filter material has been established with the aid of an 8-in. perforated corrugated metal pipe, placed at the toe of slope of the filter material in such a way that the base of the structure will be adequately drained. In other locations where it was possible to use filter material from

the fill to the outboard slope under the retaining wall, a French-drain effect was developed directly with the gravel.

Material being used for the three retaining walls is Armco metal bin-type material of standard manufacture. Ten, 12, 14, and 16 gauge metal is being used, depending on wall height and loading. The thickness of cribs in the wall also varies, depending on the amount of load, with the thickest cribs placed in the center where the load is greatest. The seaward side of the wall will form a straight line, width variations being taken care of in the highway fill on the inner side. All material arrived on the job asbestos bonded, and receiving a paint coat of Koppers No. 50 bitumastic enamel as erected.

- The 3,000-lb. tamping ram, contained inside a steel pipe shell, compacts material in the center of one of the cribs.



● **Erection Methods.** Field construction on the unique job was cheerfully organized under Don Lawson, general superintendent. Part of the job was to work out some system of traffic control around the three locations. Portable warning blinker lights were rented from Blinker-Lite Supply Co., both for daytime and nighttime warning signs. Flares were placed at both ends of the construction section at night, and a flagman used in daytime to let traffic through with least interference.

Excavation at the retaining wall locations was handled by two principal methods. An angledozer, mounted on an International tractor, pioneered its way down to the center of one of the locations and pushed most of the center material down the steep slope toward the seashore. Each location was approximately 300 ft. straight up above the sea, so this was rather a



● (Left): Barricades and sandbags along site of a slip out. (Right): International TD9 tractor with Ateco loader gouges backfill material from nearby cut slope.

spectacular operation. The dozer work, however, was finished without mishap.

In the other sections a Lorain 20-ton Moto-Crane was used with a 50-ft. boom and an Owens  $\frac{3}{4}$ -yd. clam bucket. This machine, working from the highway detour skirting the failed areas, clammed out the necessary excavation, removed old timber or rubble masonry cribbing where necessary, and dumped material outboard over the slope. In each case the failed areas were excavated back to sound material, so that the sloping bin walls could be started on sound ground.

### Shipping Metal Sections

After being trucked from San Francisco 115 miles, the metal sections were unloaded at each site as needed. Superintendent Lawson got a good start at the first location by erecting the wall in 5-ft. sections and lowering each section on its bedplate with the Lorain Moto-Crane. Select backfill material, containing a high percentage of cohesive clay particles, then was dug out of the bank at several locations along the highway, trucked to the crane and rehandled into the bin's cribs. The fill also was being replaced in the area between the bin and the existing roadway embankment. A small Schramm 105 cfm compressor supplied two Gardner-Denver pneumatic tamping guns, to compact this material in thin lifts. Layered compaction was done with particular care close to the metal columns and bin separators.

Excellent compaction in the center of each bin was developed with a homemade tamping outfit. This consisted of a 16-in. pipe section about 20 ft. long carried on the load line of the crane. Inside this pipe was a ram made of a small-diameter steel pipe filled with concrete and ballasted to weigh 3,000 lb. By positioning the guide pipe over uncompacted fill and dropping the ram by gravity, the dirt

was tamped to a high degree of density. The truck crane also was used to swing metal units for bin sides, separators and columns into position as they were needed. Bolts were tightened by hand wrenches. The bitumastic paint coat was applied by conventional brush methods.

An average crew of eight men erected an average of about 2,000 sq. ft. of completed wall per 8-hour day. Completion of the job was expected to ease one of the worst problems for maintenance men assigned to this scenic highway.

The project was designed under J. C. Young, engineer of design, California division of highways, of which George T. McCoy is state highway engineer. It was built by the San Luis Obispo district under acting district

engineer L. L. Funk. Resident engineer was D. E. Delvey. Don Lawson was in charge of the contractor's operation.

● Earth-moving and other construction equipment over the roads for short distances is possible in Massachusetts without registering these vehicles. Pending legislative bill sponsored by the New England Road Builders' Association, such vehicles can be moved by special permit.

● The 156-mile Indiana toll road is to be dedicated September 17, this year, according to Commission Chairman Dillon Geiger. About 80 miles of 4-lane highway, plus ramps and connectors is to be paved during the 1956 spring and summer.



● Wall under construction, as seen in relation to the highway.

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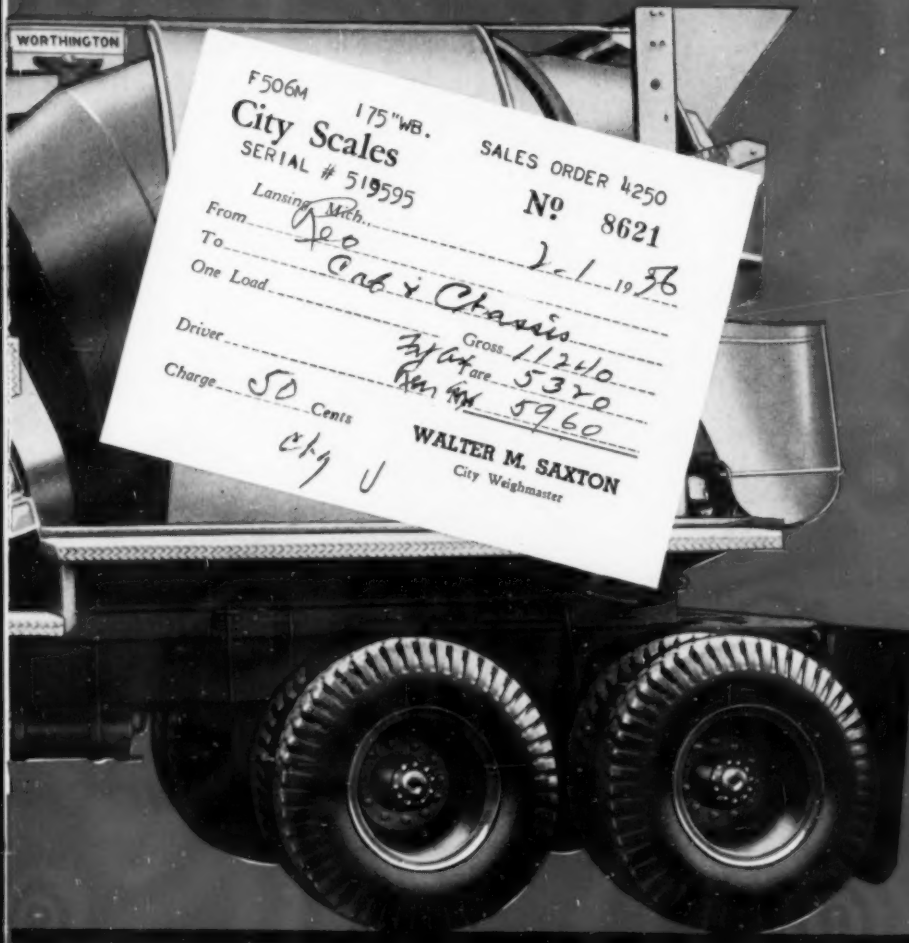
Reo's exclusive front-axle-payload design places more weight forward—giving you an extra 2 cubic yards of concrete every trip. With it, you can haul your regular daily volume with fewer trucks and drivers . . . or increase volume without increasing your fleet.

For states that permit greater axle loadings than 32,000 lbs., Reo builds the F-536M—52,000 lbs. G.V.W.

Additional hundreds of pounds can be added to the carrying capacity of the new Reo F-506M with Reo's optional front-end power take-off. The PTO also eliminates extra fuel and maintenance costs of the mixer's auxiliary power unit.

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... for more details circle 244, page 16  
ROADS AND STREETS, May, 1956



● English Airfield runway under construction showing the sequence of concreting equipment.

## Massive 3-Layer Runway

*Editor's Note: Lean rolled concrete platform layer placed, followed by a 12-inch medium-concrete layer and an 8-inch concrete top slab, for this strip designed for heaviest planes. Presented to ROADS AND STREETS readers many of whom will, as government engineers or as contractors, participate in the design and construction of heavy airfield paving in the United States.*

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Roads and Streets**

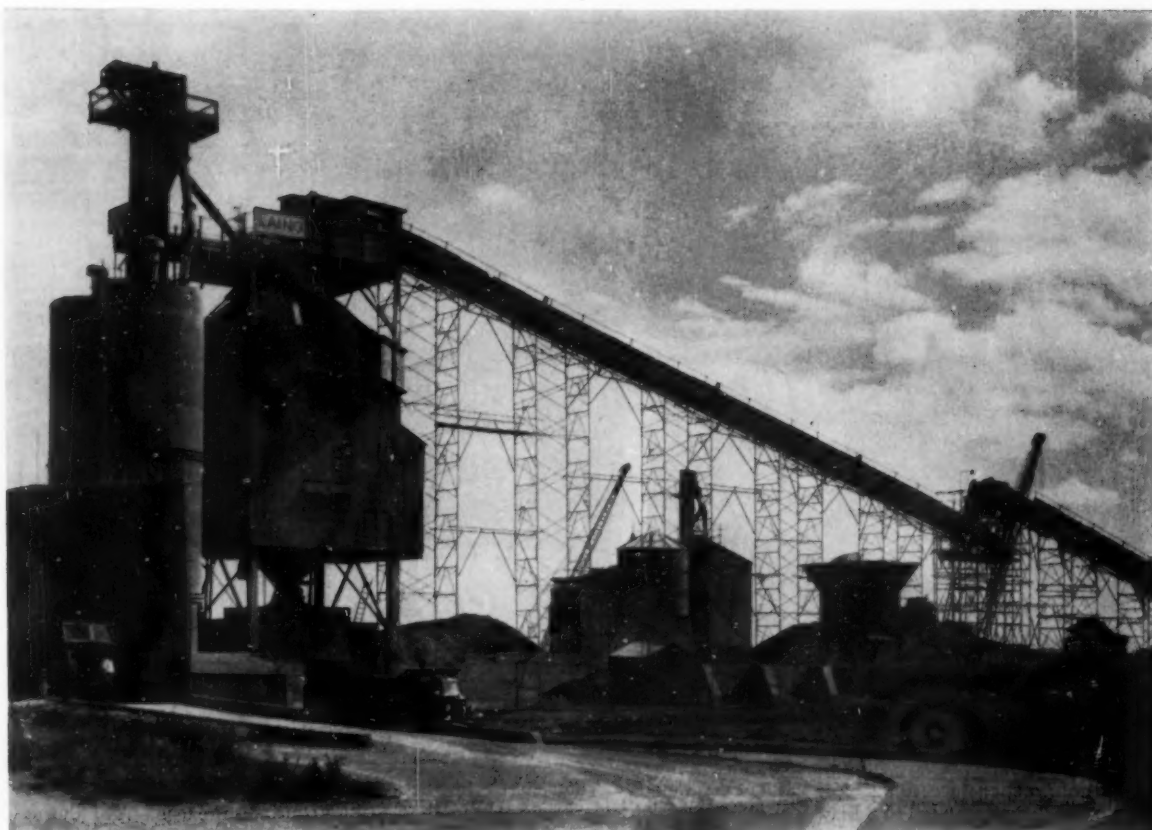
CONSTRUCTION methods employed on a recent English airfield project are remarkable from several points of view. John Laing and Son Ltd., was faced with a project involving the construction of two new runways, one 10,500 ft. long and 300 ft. wide, the other 6,300 ft. long and 200 ft. wide as well as the strengthening of two existing runways by the addition of a resurface slab.

Feature of this project is the extraordinary bearing capacity of the runways, designed not only for the heaviest existing aircraft but also for possible future types not yet produced. The runways of rigid construction have a prepared depth of nearly three feet.

A major point of interest in its design and construction was the close control of concrete quality. Another was the high degree of mechanization and remarkable organization of the whole series of operations which involved a number of techniques new or relatively so in British airfield construction.

Finally, the speed of construction was noteworthy — a rate of 3,600 lineal ft. per day, equivalent to an 8 in. by 24 ft. wide motorway slab.

The runways were constructed in strips 20 ft. wide. The subgrade was first leveled and any areas which seemed of particularly doubtful bearing value were excavated and filled with ballast placed and compacted



● The large capacity batch plant for the English airport project, involving long conveyor flight to the bins. Second plant and stockpiles are seen in background.

## Built for English Airfield

in 8 in. layers. A layer of ballast was placed over the whole leveled surface and compacted to 8 in. thickness by 8-ton tandem rollers, then the following concrete layers were placed.

### Lean Concrete Roller

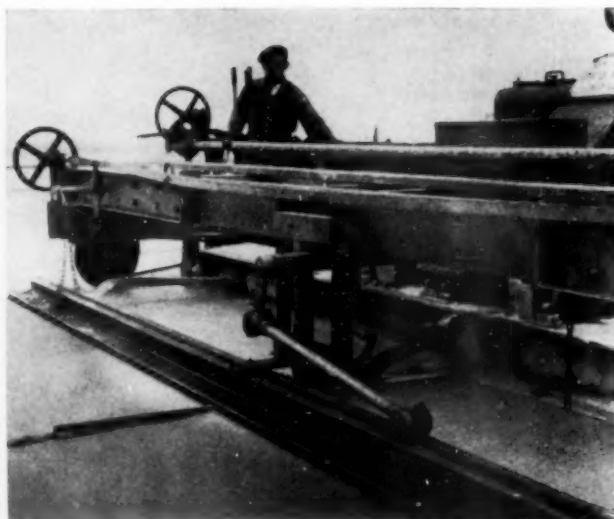
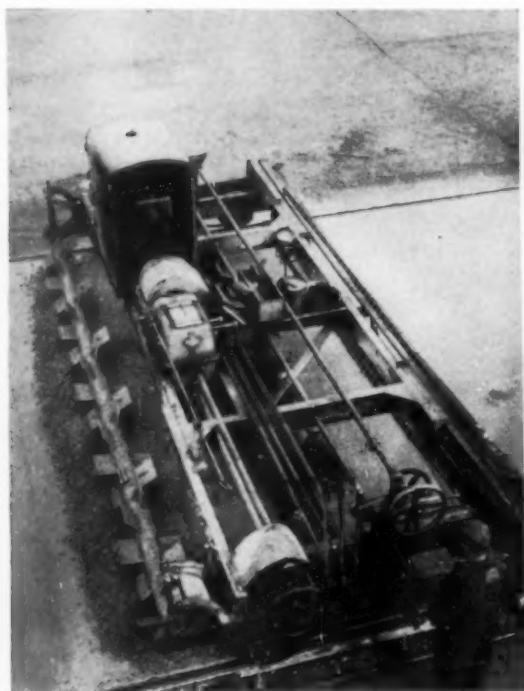
1. 6-in. thick lean-mixture concrete slab was placed on top of the ballast to serve both as a base for the two upper slabs and as a working surface on which the contractor's traffic could run during construction. The mix, batched by weight, was in the proportions of one part of cement to 15.4 parts of clean ballast to which a proportion of  $1\frac{1}{2}$  -  $\frac{3}{4}$ -in. stone had been added to correct gradation. The concrete was mixed in four Koehring

34-E dual drum pavers having 34 cu. ft. nominal batch capacity. After spreading it was compacted in 20-ft. lanes between side forms by rolling with 10-ton tandem rollers. The only joints in this slab are expansion joints at 120 ft. intervals. Lanes were completed at rate of 180 lin. ft. per hr.

2. The main load-bearing slab came next, a 12-in. layer of medium quality concrete for which the specified minimum strength was 3,300 psi at 28 days. The mix, batched by weight, was one part cement to 8.5 parts graded aggregate in sizes from  $1\frac{1}{2}$  in. down to  $3/16$  in. It gave average 28-day compressive strengths of 4,700 psi. The slab was laid in one thickness.

3. The 8-in thick top slab was designed to further distribute loads, insulate the lower slab from variations in temperature and to provide a good wearing surface for the runway. Here the mix by weight consisted of one part cement to 7.25 parts of graded aggregate. It was required to give minimum strengths at 28 days of 4,000 psi. This concrete in practice developed 5,700 psi.

Batching, mixing, placing, compacting finishing and joint-cutting were mechanized to a large degree and carried out with a minimum of labor. Materials were batched at two central weigh-batching plants, between them capable of keeping the four large pavers in continuous operation.



● An S.G.M.E. finisher (Belgium) in action on the English project.

● The S.G.M.E. finisher has a cutting plow on the rear for forming large turtle contraction joint  $2\frac{1}{2}$ " deep at lane center.

Aggregates for the two top slabs were drawn from one vast stockpile divided into sections according to aggregate size. They were fed to a Blaw-Knox batcher by grab and to another, a Winget batcher, entirely by mechanical means. The Winget "Octobin" batcher, capable of batching 160 cu. yds. of concrete per hour, was operated by two men. This was possible by the following process:

A tunnel was constructed below the stockpile, with gates opening into it from under each size of aggregate. As required, these gates were opened to allow the desired type of aggregate to fall through to a conveyor belt running from the tunnel to the batching plant some 150 yd. away; it deposited the aggregate in bins immediately above the batcher. One man at the batching plant kept the bins filled with the required size of aggregate by a simple push-button-operated control mechanism, operating the tunnel gates. The other man operated the weight-batcher. Cement in bulk was stored in silos alongside the two weight-batchers.

The batched material was delivered from the plant into trucks which transported it to the dual-drum mixers each capable of turning out some 68 cu. yd. of mixed concrete per hour. The machines, mounted on crawler tracks traveled alongside the strip being paved, and moved forward as concreting proceeded.

The whole process of placing,

spreading, compacting, finishing, joint-cutting and curing was carried out continuously. The concrete for the two main slabs was placed from the mixers by boom and bucket in front of a Blaw-Knox spreader; the spreader was followed immediately by a Stohert & Pitt compacting machine which gave it a thorough initial compaction. This compactor was followed by a second — a Belgian S.G.M.E. machine — which gave a smoother finish to the surface. Extra compaction was given to the edges by internal vibrators attached to the spreader.

#### Joint Cutting Machine

Last step was the use of a special S.G.M.E. joint-cutting machine, in which a wedge-shaped steel knife was vibrated into the fresh concrete to form the joints. Dummy joints 4 in. deep were located every 20 ft. in the 12-in. lower slab, with full-depth expansion joints every 60 ft.; in the top slab dummy joints  $2\frac{1}{2}$  in. deep were formed every 10 ft. and expansion joints at 60 ft. Longitudinal joints were formed down the center of each 20 ft. strip by means of a plow attached to the finishing machine. All joints were staggered 5 ft. with respect to the joints in the slabs below.

Concrete for each layer was cured by spraying with a membrane curing compound. Meticulous control was exercised to insure consistently high quality of concrete throughout the job. Major importance was attached

to maintaining the correct water-cement ratio and accurate mix gradation, a laboratory being established on site. The moisture content of the aggregate was further checked by determinations at frequent intervals, and mix proportions were counter-checked by cement consumption measured against volumes of concrete produced.

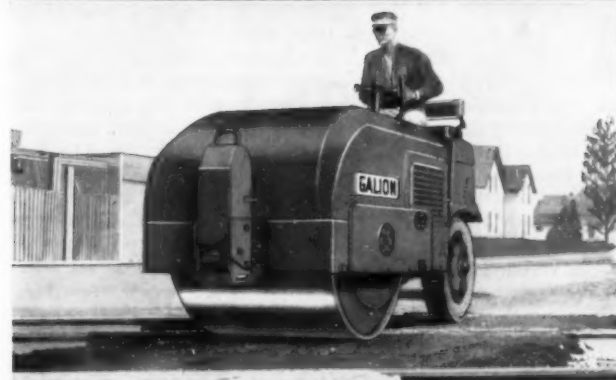
Consistent workability was regarded as the main factor in judging the maintenance of quality.

#### Visual inspection aided by simple check list

Equipment inspection by a quick visual routine can be an important part of the preventive maintenance routine, notes "The Co-Operator," published by Le Tourneau-Westinghouse. Snooping around a machine "by eye" helps uncover minor troubles before they can become major ones. This should be done regularly as part of the maintenance and lubrication routine.

Some of the things which should be checked: Cooling system hoses; signs of oil leaks under the machine; drive belts on fan, water pump and compressor; fittings, tubes and hoses generally; electrical connections and conductors; cables, for worn or frayed spots; loose nuts and bolts; tires, for cuts, bulges and rock wedges in treads; electrical motor brakes, tail-gate rollers and other moving parts; battery water.

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... for more details circle 214, page 16

ROADS AND STREETS, May, 1956



● Rough clean-up for ditch line along turnpike widening, in preparation for placing concrete gutter section. In between push-loading D Tournapull, Caterpillar 12 grader gives ditch bottom a curved cross-section (as shown by curved shadow under machine).

## Special blade finegrades ditch for paving

Hand labor was completely eliminated in preparing the final ditch cross section for placing concrete ditch pavement, along a section of the New Jersey Turnpike. One of the accompanying pictures shows this job, with concrete gutter pavement in place in the distance and grading operations in progress in the foreground preliminary to extending the concrete.

The procedure on this job which was part of the widening contract held by S. J. Groves and Sons Company this past summer, consisted of routing a D Tournapull through the sandy material at the ditch line to cut it down approximately to grade. A Caterpillar 12 motor grader helped push-load the scraper in the sandy soil.

When the ditch was about down to subgrade, the grader operator dropped a special blade and with a single pass, or at least not over two passes, left a circular segment shaped contour along the ditch bottom, all ready for placing concrete.

The curved section was accomplished by means of a curved drop blade section fastened on to the regular blade of the motor grader, as shown in one of the pictures.

### Growing casualty list of contractor failures

Dun and Bradstreet's reports show that failures among construction contractors hit a new high in 1955. The

number of failures stood at 1404, an increase of 8% over 1954. Liabilities rose 46% to a total of \$83.2 million. The 1956 figures for the first eight weeks of the year stood at 251 — an increase of 24% over the same period in 1955.

The figures on this casualty list are alarming to everyone in the industry. They stem from three apparent factors; namely, competitive weakness, inexperience and anxiety. The unit productivity has outgrown the number of units to be produced and the ability of the construction market to supply new units to take up the surplus.

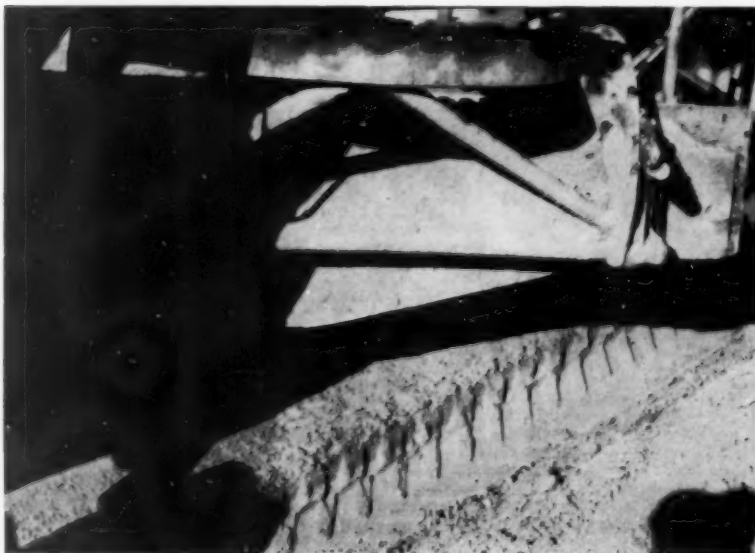
These facts, however, do not affect a reduction in the cost of doing business — rather they increase it. Our industry has been the central point of one of the greatest booms in our economic history and our individual firms have made less profit than in the leaner years. The casualty list is growing and will continue to grow until we recognize the fact that cost and not competition must be the controlling factor in the business of bidding and building roads. — *Bulletin, Virginia Road Builders Association.*

### Connecticut truck operators commended for safety

Truck drivers in the maintenance wing of the Connecticut state highway department successfully passed a recent spot check of their compliance with safety rules, according to a report in the department's staff publication. "It was revealed," noted assistant chief engineer W. T. Schuler, "that all safety devices were in good working order and that all trucks were clean inside and out. The drivers have taken pride in their responsibilities."

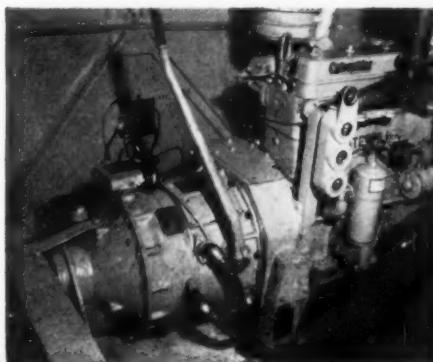
The employee publication listed the names of drivers in each district congratulated for their record.

● Close-up of curved drop blade used on the motor grader for the circular segment shaped cut.



## Torque Converter power-packages on three cranes

**save \$60<sup>00</sup> a day  
in fuel costs alone!**



Close-up of Caterpillar D315 Diesel Engine, driving through a Twin Disc Model CF Torque Converter. This powerful combination is used by the Valentine-Clark Corporation of St. Paul, Minn., to power their Link-Belt Crane, shown below.



A Twin Disc Torque Converter, on each of three cranes, is saving the Valentine-Clark Corporation of St. Paul, Minn., \$20 a day in fuel costs alone—or a total of \$60 for all three.

This company chemically treats poles to prevent destruction by weather and insects. Logs are shipped in from the West Coast, debarked and then chemically treated. The three cranes are used to unload the logs into treating pits, and to reload them for shipment.

This equipment includes one Link-Belt and two American Hoist & Derrick Cranes—all of which are equipped with Caterpillar D315 Diesel Engines, driving through Twin

Disc Model CF Torque Converters.

Each of the cranes has been converted from steam power, and since switching to the powerful diesel engine-torque converter combination, several advantages have been realized. According to Lawrence Martin, Superintendent of Valentine-Clark, "In addition to our \$20 a day saving in fuel—*per crane*, we've increased production more than 20%. We've also decreased labor costs in eliminating time consumed to fire boilers, and to make water stops."

The next time you repower or purchase new equipment—*specify a Twin Disc Torque Converter* for a smoother, easier, more flexible flow

of power (up to 6:1 multiplication) and for longer equipment life through cushioning of shock loads. *Your production will increase . . . your costs will decrease.* Contact your engine dealer for more information. Twin Disc Clutch Company, Racine, Wisconsin, Hydraulic Division, Rockford, Illinois.



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**ROADS AND STREETS, May, 1956**

## Roadbuilders Still "Willing and Able" to Tackle Expanded Program

*The American highway industry is capable of handling easily the multi-billion-dollar national road building program envisioned in the current legislation before Congress, industry representatives told the House Subcommittee on Roads during April.*

**By Duane L. Cronk**

Washington Editor of ROADS AND STREETS

**S**PEAKING for the American Road Builders Association on the industry's latest capacity study, five highway leaders reported that:

- Contractors in the road building business could undertake an \$8.6-billion road construction program next year "with their present organizations and equipment fleets." In another year, the productive capacity of contractors could be expanded to handle \$10.8 billion worth of work. And by the third year, \$12 billion worth.

- Construction equipment producers are already set up to turn out enough machinery for an \$8.5-billion program by next year.

- Sufficient manpower is available to meet contractor personnel needs.

- The cement shortage will be speedily eliminated if Congress drafts a definite schedule.

- The supply of aggregates could be boosted 39% this year over last, and production doubled by 1958.

- Production of steel, now in short supply, can be upped sufficiently to meet the needs of an accelerated road program.

The testimony of the witnesses was based on findings from ARBA's second industry-wide survey of capacity. More than 6,000 contractors were polled, as well as materials producers, equipment manufacturers and state highway departments.

The purpose of the sweeping survey

was to banish any doubt that highway contractors are willing and able to carry out a greatly accelerated program.

### AT 51% CAPACITY

In last year's capacity report to the Congress, ARBA reported that contractors were able to accomplish \$7.4-billion worth of highway work per year. This year's task force, after a new appraisal of contractor capacity, told the Subcommittee that the road builders can undertake a \$8.6 billion highway construction program without materially expanding their present organizations.\*

The most important finding of the Association's contractors' survey was that the road builders operated at only 51% of their productive capacity last year and could quickly and easily move into high gear at any time now. The contractors have no qualms about availability of manpower or construction machinery. They did, however, indicate where they feared bottlenecks might occur.

- 55% of the highway contractors responding felt that administrative delays by highway departments might limit their capacity.

\*The original Task Force Reports on highway industry capacity were published in ROADS AND STREETS, January, 1955.

- 45% feared that the current shortage of wide flange steel beams, structural steel shapes, and cement might retard their ability to operate at top speed.

The contractors predicted that the higher volume of work involved in the proposed national highway could be accomplished economically, particularly through efficient equipment management.

S. Howard Brown, president of Brown, Davis, and White, of Grantville, Pa., presented the case for the contractors to the House Committee.

### ENGINEERING SHORTAGE

It has been generally understood that the first bottleneck in any greatly expanded program would be the design load involved, considering the shortage of engineers in the state highway departments. The bulk of the national highway program would be in construction of routes on the National Interstate System, most of them requiring new location studies and design to high engineering standards.

However, the shortage of engineers will not delay the program if states continue to make better use of their existing staffs and if technological advances that cut the engineering work load are fully utilized. H. G. Sours, consulting engineer of Columbus, Ohio, told the Congressmen. Mr. Sours pointed out that the 1956 road construction level is climbing to near \$6 billion, from \$4.6 billion last year, "and there have been no reports of the program slowing down because of engineering limitations."

The task force put its faith in the hope that state highway departments will turn to aerial photography and photogrammetry to accomplish much of the location job and to the new electronic computers to figure earthwork quantities and other calculations.

In the long-run, advance planning along orderly lines will be most effective in getting the program off to a

good start and permitting full productivity, the task force told the Subcommittee. Mr. Sours pointed out that the value of highway work for which plans are wholly or partially complete has already risen to \$19 billion. This reservoir of partially engineered jobs will give design engineers a running start when the "Go" signal is given.

If the entire National Interstate System were authorized for construction over a stated period of years, the ARBA spokesman said, engineering requirements would be vastly simplified. Highway departments could provide definite work schedules for surveying, design, plan preparation, specifications, estimating, and staffing. Contractors would benefit from the development of sensible contract-letting schedules. The additional time available would permit them to more completely study job requirements, investigate the availability of materials, and build up their personnel organization.

The task force cited cases of substantial increases in engineering productivity through improved organization, simplification and standardization of plans, new methods and devices, awarding of larger contracts to eliminate duplication, revision of some contract procedures and by training sub-professional personnel to relieve engineers of routine duties.

"In one state," Mr. Sours said, "the size of the highway program has been doubled in the last two years without any marked increase in the number of engineers employed, by streamlining engineering procedures. In this particular highway department, the ratio of the number of engineers employed per million dollars of construction was 9.5 in 1954. In 1955, this was reduced to 5.5 and it is expected that a further reduction to 4.0 will be made in 1956."

The task force also advocates the use of consultants "to augment highway department forces and to absorb overload."

### MATERIALS OUTLOOK

Shortages of cement have prevailed throughout several areas for some months. Even last year in committee hearings on highway bills, Congressmen revealed concern over such shortages and questioned if a stepped-up program should be considered.

Speaking for the ARBA task force investigating this problem, A. T. Goldbeck, engineering director of the Na-

tional Crushed Stone Association, told the Congressmen:

"The cement industry . . . has taken definite action to meet the needs of the construction industry."

Productive capacity has been boosted from 294 million barrels annually 15 months ago to 320 million barrels at present. New plants under construction will boost capacity to 350 million barrels by the end of this year, to 370 million barrels next year and to approximately 407 million barrels in 1959. (That would be a 40% increase in less than four years.)

In 1955, about 64 million barrels of cement went into highway work, including production of concrete pipe. The industry estimates that 81 million barrels will be made available for highway work this year — an increase of 26%.

"This amount of cement will," Mr. Goldbeck said, "except for possible regional shortages, adequately supply a highway construction program of \$5.7 billion. This is equal to the anticipated program level for 1956. It is expected therefore, that, in certain areas, regional shortages will still exist during 1956 and that it will be necessary for the highway engineers to place their construction well in advance in order that the cement producers can take full advantage of their production capacity, and so that the cement producers can keep their capacity seasonal reductions to a minimum."

Goldbeck further said that "the estimated 1957 cement production ca-

capacity should, in the light of presently-known requirements for other phases of construction and for maintenance, support a 1957 highway program of about \$7.5 billion per year. The 1958 production capacity of 370 million barrels will support a highway program level of approximately \$8.8 billion per year and the expansion of cement capacity to 407 million barrels per year will support a highway program of almost \$11 billion per year."

Mr. Goldbeck told the Congressmen that of the 821 million tons of *aggregates* produced in 1955, 410 million tons went into highway construction. Commercial producers of crushed stone can increase their output 39% in a year, 66% in two years, 97% in three years.

A 39% increase would support a \$6.2-billion highway construction year, a 66% increase would support \$7.4-billion worth of road building, and a 97% increase by 1958 would support a program of \$8.8 billion. All these levels would be increased by an increase in the production of gravel or slag.

"There is no possibility of a shortage of *bituminous materials*," Mr. Goldbeck reported. "Little, if any, difficulty is expected in expanding production to meet the requirements of the highway program."

Of the 18.6 million tons of bituminous materials available in 1955, highway construction used only 6,044,-

(Continued on page 79)

### Plenty of Equipment for Road Construction

Contractors' equipment fleets have been substantially strengthened since the last task force report in 1955, Julien R. Steelman, president of the Koehring Co., Milwaukee, told the Congressional committee. Road builders have not only added many new units, but have replaced older machines with more efficient units. As for the possibility of increasing equipment manufacturing capacity, Mr. Steelman reported that 22 segments of the industry have reported they can boost capacity from 10% to 53%. The manufacturers invested \$200 million for plant expansion last year, and more assembly lines are in the blueprint stage.

Enough equipment can be produced as of now to support a \$8.5-billion highway program next year. By 1959, the equipment makers can be producing enough machinery to build \$10 billion worth of roads a year.

National highway legislation pending in the House currently would authorize \$37 billion in federal-aid, to be matched by \$14 billion by the state highway departments. The construction program proposed would be spread over 13 years.

The ARBA task force's conclusion was that the highway industry could, with proper construction planning, support a program of "at least \$8 billion per year in the next few years and as much as \$10 billion per year if sufficient lead time is allowed for them to expand."

\*See report, "Wisconsin Puts its Engineers in Engineering Jobs," by Deane L. Cronk, *ROADS AND STREETS*, April, 1956.



John A. Denie's Sons' ready-mix concrete plant, located at Memphis, Tennessee, showing part of their fleet of Macks, which now totals 60 and is still growing.

**John A. Denie's Sons Company, Memphis, Tennessee, reports:**

## **"To assure on-time service customers request delivery by MACKS"**

Four years ago, the John A. Denie's Sons Company, one of the largest and oldest ready-mix concrete plants in the country, recognized their need for the most dependable, heavy-duty truck chassis available. Their problem was one of making ready-mix deliveries on time to almost inaccessible locations over extremely rough terrain. To solve it, Denie's tried just about every make of equipment. Finally, they purchased four Mack six-wheelers.

"Shortly after our Macks went into operation, customers started to call and request that their orders be delivered by Macks. They knew they could depend on them to make delivery on schedule, regardless of the rugged ground over which they had to travel. *Our records show that no Mack has ever failed to deliver a load on time,*" writes Mr. Forrest Ladd, Denie's executive vice president.

After noting the widespread customer satisfaction with their reliable service, and a thorough check of their operating costs, Denie's president, Mr. M. A. Moss began to increase their fleet of Macks. Today

they have 60 Macks, and the number is still growing.

"Another interesting fact revealed by our operating reports," states Mr. H. O. Pommer, vice president in charge of operations, "is that Denie's has never had to replace an axle shaft, driveline, ring gear, pinion, brake drum, or reline any of the brakes on any of its Macks."

Denie's executives, like so many others, know from experience how well their investment in Macks has paid off for their company.

Let your Mack Branch or Distributor give you complete details... find out how Macks can improve your hauling operations. Mack Trucks, Empire State Building, New York 1, N. Y.

**MACK**  
**first name for**  
**TRUCKS**

3916

... for more details circle 232, page 16

## Second ARBA Survey

(Continued from page 77)

000 tons; about one-third of the total. The remainder was used in highway maintenance and in the production of roofing materials.

The industry could increase bituminous production by 15 million tons, which would provide more than twice the increase in production required for an \$11-billion highway program.

### STEEL STILL SHORT

The materials task force chairman pointed out that a nationwide shortage of steel has developed and is delaying deliveries as much as ten or twelve months.

He called the outlook for the future "brighter," however, when industries which have been heavy steel consumers are expected to reduce their demands on steel producers.

In addition, industrial expansion is expected to increase 1956 production from 117 million tons to 120 million tons.

Highway construction demand — about two million tons — is only a small part of over-all steel consumption. Any productivity gains in the steel industry are likely to benefit road building significantly.

Mr. Goldbeck reported that within two or three years both standard and wide flange structural steel shapes will be available in a supply sufficient to provide for a \$10-billion road program.

Steel plate capacity and production of reinforcing bars are both ample for any foreseeable highway program level.

"There seems to be no reason to believe that the (corrugated metal

and concrete) pipe industry cannot meet any probable demand by the highway industry," he said.

### New emergency speed limit for Thruway

The New York State Thruway Authority has decided to reduce the maximum legal speed limit from 60 to 35 mph on its system whenever adverse driving conditions warrant. General Manager Holden A. Evans, Jr., said the speed limit would be cut "whenever visibility becomes so restricted or whenever weather or road conditions are such that speeds in excess of 35 miles per hour appear to be hazardous."

The new procedure adopted after careful study, follows the precedent of several other turnpike agencies which reduce their maximum speeds under similar conditions.

Thruway patrons will be notified of speed-limit reduction in three ways:

1. Along the affected section, all regular speed limit signs will be covered by a supplementary red sign designating the 35 mph limit.
2. Each toll booth within the affected area will display red-on-white 35-mph signs for patrons entering.
3. The Authority's automatic telephone-answering devices in Albany and Syracuse, which give callers Thruway road conditions, will include an announcement of reduced speed and specify areas affected.

4. The reduced-speed signs also will specify the nature of the hazardous conditions, "snow," "fog," or "ice."

The Authority will order the special limit on the basis of reports and recommendations from State Police of the Thruway Detail. The troopers and Thruway personnel patrolling the superhighway will make the necessary sign changes.

### Army bridge truck does double duty

Attachments for the Army standard 5-ton bridge truck have been developed by the Corps of Engineers Research and Development Laboratories, Fort Belvoir, Virginia, to provide a means of unloading heavy components of military bridges from their transporters without a crane.

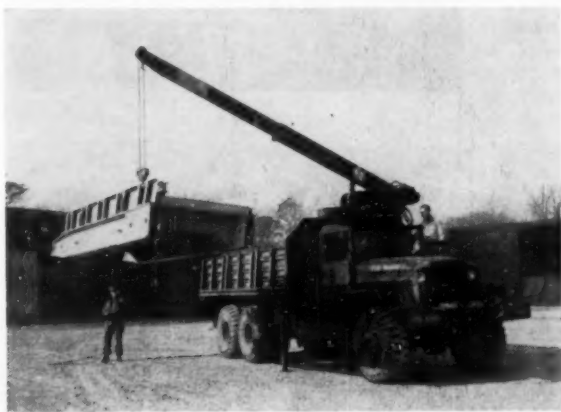
Slated for troop tests in the United States and Europe are a hydraulically operated boom, and an "A" frame which can be attached to the front bumper in the field. The 16-ft. boom can unload equipment from its transporter and from other trucks. It can be extended, retracted, tilted and swung through an angle of 220 degrees.

Consisting of two telescopic box sections mounted on a column near the backboard of the truck, it is operated by a man standing adjacent to the driver's seat. Control levers are mounted on the front of the swing mechanism. Hydraulic power is furnished by a pump driven by the truck's engine. Outriggers on each side behind the cab add lateral stability to the truck.

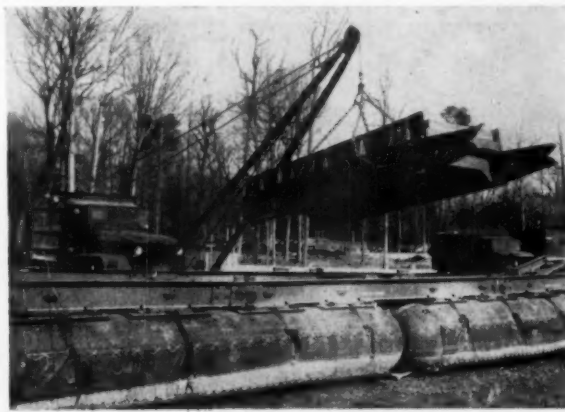
Fabricated of standard steel shapes, the A frame is about 20 feet long in a horizontal position and is capable of unloading equipment from other trucks. The unit can easily be disassembled and carried on the truck.

Its lifting power is supplied by the truck winch. Lookout blocks are required for the front spring to prevent excessive deflection. Two "U" bolts are utilized on the backboard to provide "tie-downs" for the back cables. The angle of the boom can be adjusted simply with turnbuckles in the back cables.

The attachments are also capable of placing deck panels on floating bridge pontoons and on fixed bridges.



● Heavy deck panel of Army bridge is unloaded by hydraulic boom developed by the Corps of Engineers.



● Deck panel is about to be placed on inflated pontoon by bridge truck equipped with an "A" frame.



● Two Clipper concrete saws being towed to a working location. (Below, right): Sideboards used as ramp.



● One saw has a 12-in. blade for cutting through integral curbs.

## Handy Tow Cart for Concrete Saws

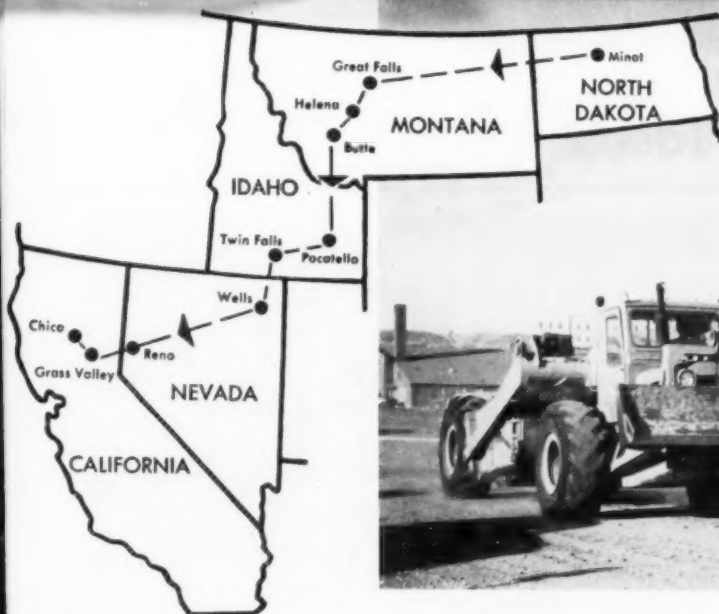
**W**ICHITA's booming suburban paving program entails sawing of joints in concrete, under city specifications. Which means frequent jumps of the sawing crew in following the pavers through the various subdivision jobs.

Transportation of saws and handling them on and off of trucks was a problem for Globe Construction Co. until the tow cart here pictured was devised. The cart was made with six air-tired cart wheels, framed together with light steel channels given a wood platform. Sideboards which protected the machines against accidental slewing off sideways during transit, are made to double as ramps for trundling the saws on or off the cart — see pictures.



● (Below): Sawing, cross joint with 8-in. Target carborundum blade. Clipper diamond-tipped steel blades also used. (Left). Blowing out joint before sealing — air was supplied by Le Roi 105 compressor.





# Drives 1,750 miles... total cost \$170 total saving \$800

What would you do if your dirt-moving equipment was in North Dakota and you had the chance to work in California?

If you had crawlers and scrapers, or big self-propelled scrapers, you'd probably ship them by rail. It would cost you at least \$870 per unit one-way, and the trip would take a week or 10 days. Expensive? Yes, but about the only method you could use.

Vernon Testerman, Minot (North Dakota) contractor, had another solution to the problem. His 7-yard D Tournapull, he figured, could easily make the trip under its own power. After all, he had driven the "D" all over North Dakota. The unit's low-pressure tires did no damage to pavement. It was narrow enough and light enough to go anywhere. And it could travel most of the way at 28 mph.

Remembering these advantages, Contractor Testerman checked his machine, loaded fuel drums and

other supplies in the scraper bowl, filled up the tank and started off.

## Travels 80 hours, averages 22 mph

First check-point for contractor and machine was Great Falls, Montana. From here, the "D" traveled to Helena and Butte, Montana... then through Pocatello and Twin Falls, Idaho... Wells and Reno, Nevada... and Grass Valley, Calif.

On the 8th day, Tournapull arrived in Chico, California. It had traveled 1,750 miles. Total running time, as clocked by the hour-meter, was 80 hours.

"Cost of the trip," writes Testerman, "was exactly \$170. That includes fuel, oil, meals, hotel, even cigarettes for the driver, Garry Dibble of Stanley, N.D. It also includes the price of a new water pump. I also had to buy a license in Montana, which cost \$11; otherwise I wasn't stopped or asked any questions except by curious people who said I was crazy. They will really

think so when I meet them on the road back home to North Dakota."

Or maybe they won't think so, when they realize Testerman saved \$700 on the one-way freight bill alone. Or that he also saved about \$100 for air or rail transportation for his operator. Plus 1 or 2 days in time. Plus a lot of trouble loading, unloading, etc.

## Finishes jobs before others arrive

Chances are, you may never have to make a thousand or two-thousand mile trip with your dirtmoving equipment. However, Tournapull's work-and-run ability cuts non-productive time to a minimum on any length move. With Tournapulls, you take the shortest route between jobs, over main highways and through cities, to make the most economical use of manpower and equipment. As Mr. Testerman puts it, "With D Tournapull, you can travel to a small job and have it finished before another type of machine could be loaded and moved. The money you once paid for hauling can be put in your pocket."

Ask us for a demonstration of the LeTourneau-Westinghouse D Tournapull so you can check its mobility and other advantages for yourself. Call to arrange time and place.

Tournapull—Trademark Reg. U.S. Pat. Off. DP-647-G-b

**LeTourneau-Westinghouse Company**

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On the job, "D" Tournapull usually self-loads. Here it heaps 5 pay yds. of sandy loam in 1 min. Typical 900' cycles take 2½ minutes.



Tires provide such good compaction, rollers often are not needed. Nor are small tractor-dozers; "D's" blade does much of their work.



# Job and Equipment Ideas

## Scraper backs up to pusher on this job

Sometimes in cramped quarters it may pay to jockey the scraper around and back it over the loading path, so that the waiting push tractor can load the scraper downhill and in the direction of the spreading area.

This procedure was used profitably by a South San Francisco contractor, Robert A. Farish, for a project where his scrapers had to work in close quarters to level a highway through a school grounds. As described by Le-Tourneau-Westinghouse, two C-Tourneapulls were used very satisfactorily in this manner with one pusher.

## Brush-clearing tool has highway job possibilities

This weird looking machine is said to be the fastest unit devised for brush and timber clearing. Mounted on a 200 hp International TD-24 tractor, it consists of a V-shaped cutter, 13 ft. long, 14 ft. wide and constructed from 1½ in. mild steel.

The machine was built by Wade Lahar Construction Company, Mountain Home, Ark., for use in clearing a 23,000 acre reservoir for the Buford dam site in Georgia. Highway contractors in timbered mountain country will be interested in the unit which has a blade serving as a saw-tooth for cutting brush and timber at ground level.

Two of these machines reportedly cleared enough timber to keep 9 other



● Big load being carried over side roads near Detroit with Talbert trailer equipment involving 52 tires.

heavy tractors with bulldozers busy decking and burning. The 2½ in. steel pipe canopy helped to protect the operator from falling timber and also served to relieve stress on the tractor.

## How to carry heavy load over side roads

Recently, Morris G. Laramie & Son of Detroit, Michigan, was given an unusual hauling assignment. They were asked to move the largest transformer ever to be transported over-the-road on secondary roads.

Naturally, a piece of heavy equip-

ment such as this posed certain hauling problems and required the ingenuity and abilities of a team of specialized hauling experts. Pictured here is the solution.

Laramie used a side-by-side combination of two Talbert Model T3D-50-RG-RA trailers which provided a 52-tire surface for proper weight distribution.

By positioning the transformer on the decks of these 50-ton capacity low-bed trailers, Laramie was able to make the move safely, economically, and in the shortest possible hauling time.

Saw-toothed brush and timber cutting tool



# **"GREAT" for all-around utility work**

**says Supt. on Garden State Parkway contract**



On their 14 mile section of the Garden State Parkway in Cape May County, New Jersey, Public Constructors, Inc., Pleasantville, are using a 19 mph rubber-tired Tournatractor for all-around utility work.

This 208 hp tractor works all over their widely-scattered 2¼ million-yard sand job. It often moves ahead of the company's 33 scrapers to clear trees and brush and handle pioneer dozing. At times, it is used to level cuts and fills and to doze around bridges and culverts. Because of its speed and maneuverability, tractor-on-rubber performs these utility assignments without interfering with production dirtmoving.

Besides leveling work, Tournatractor is also used to push-load some of the contractors' 11 C Tournapulls. Where material is pure white sand, tractor's fast pusher-service loads the 16-yd. "C's" in as little as 45 seconds.

## **Used for other scattered jobs**

Tournatractor is always ready for emergency calls, too. Jobs 5 miles away can be reached in 20 minutes (or less) due to its 19 mph speed. Cleaning haul roads and dozing fill on distant sections of the job are handled quickly and efficiently. Paved highways present no travel problems for the tractor-on-rubber. It goes everywhere under its own power...

needs no blocking, planking, trailer-loading and unloading. For all around utility service, it "gives a great performance day after day," says Supt. John Franks.

Discover for yourself why the fast, mobile Tournatractor is ideal for utility-type assignments, as well as major tractor work. Phone or write for a demonstration on your job, today. There's no obligation.

Tournatractor, Tournapull—Trademark Reg. U.S. Pat. Off. T-837-H-b



Tournatractor, with its 4-wheel drive, push-loads 16-yard C Tournapull in 45 to 60 seconds. Big low-pressure tires provide plenty of traction and flotation even in this poor, sandy footing.



**LeTourneau-WESTINGHOUSE Company**

Peoria, Illinois

**A Subsidiary of Westinghouse Air Brake Company**

... for more details circle 277, page 16



● Toggle device for picking up precast concrete manhole segments.

### Toggle for picking up manhole frames

Here is a handy device developed by McGuire and Hester, contractors, in the San Francisco Bay area.

Seen in use while constructing storm sewers for the Mountain Boulevard freeway project in Oakland, California, this device consists of three hinged arms with contract plates which are spread outward when the connecting chains are lifted.

By this toggle device, the three arms exert sufficient pressure on the side of the pipe to pick it up without any further attachments.

### Digs, lays pipe, backfills in continuous operation

The Walter L. Follmer Construction Co., of Hamilton, Ohio, was awarded a contract to lay 2,860 ft. of 54 in. diameter Armco corrugated sewer pipe down 15th Avenue in Middletown, Ohio. The street is thickly overhung by trees which were not to be removed or destroyed. Also, the services were so arranged that the sewer had to be laid down the center of the street at an invert elevation of about minus 16 ft. Since the street was too narrow to permit enough side movement for shovels to

load trucks, another method had to be used to move the dirt away and backfill the pipe.

It was decided that a backhoe and conveyor would do the job. E. F. Marsh Engineering Co., of St. Louis, designed and built a 60-ft. powered conveyor. By using the conveyor it was possible to dig, lay, and backfill simultaneously. A steel shield was used to protect the men in the ditch. House connections were placed before the pipe went into the trench; then the house line was connected. A front loader cleaned-up after fill was in.

Foreman for Follmer Construction Company was Charles Stayton. Resident engineer was Frank R. Loomis, representing Floyd G. Browne & Associates of Marion, Ohio, consulting engineers on the project.

### Contractor foremen get "First Aid" training

Twenty-four construction supervisors and foremen in Minneapolis and St. Paul, Minnesota, recently completed a 10-week Red Cross First-Aid course and received "Certificates of Competency" at an informal ceremony.

Under the sponsorship of the Accident Prevention Committee of the Associated General Contractors of Minnesota (AGC), the classes were open to any contractor member of the Association who cared to send his supervisors and foremen for this valuable training. James A. Leck, of James Leck Construction Co., Minneapolis, chairman of the committee, officiated at the ceremony and presented the certificates.

### Cheap way to trench for street curbing



● This homemade excavating blade, attached to an International Drott TD-9 skid-shovel, is being used by H. C. Gale, Harrisburg, Pa., contractor to dig curb footings. Costing only \$100 for material and labor, the blade will dig to a uniform cut 22 in. below grade. It's made from 3/4-in. steel plate 28 in. wide with a 15-deg. angle forward from bottom of bucket level. The plate is supported by 2x2's, 5/16-in. angle irons, each 47 in. long.



## Earthwork *Ahead of schedule* on 49 miles of lateral ditches for Columbia-River-Basin Irrigation Project

In the "Big Bend" country, State of Washington, main canals for the Columbia-River-Basin Irrigation Project are complete. These canals carry water 150 mi. from Grand Coulee Dam to the 1¼-million acre "Basin", where ½ million acres of land are irrigated.

Branches from the main canals are now being built for distribution of water to the remaining ¾ million acres of dry and dusty sage-brush land. The irrigated land, in units of 65 to 110 acres, will be sold to farmers for gardening and grazing at prices from \$25 to \$85 per acre. This huge project is being constructed for the Bureau of Reclamation, U. S. Dept. of Interior.

Cherf Bros. & Sandkay, Ephrata, Wash., have 5 C Tournapulls helping to build 49 miles of lateral ditches for this project. These laterals are built by the "economic fill" method (see diagram). "C's" build a flat road-like runway, averaging 2' high, 12' wide, firmly compacted. Dragline follows, digging ditch in center of "run", piling dirt along each side to increase height of banks. Water level will be maintained about 6" below top of compacted dirt level. Eventually, ditch will be cement-lined.

### "Really move muck"

Describing the performance of C Tournapulls used for building the "run", Roy Johnson, of Cherf Bros. & Sandkay, said, "We like Tournapulls because they get around fast, really move muck! Perfect size for this kind of

job." Tournapulls' top travel speed to 30 mph helped on both long and short hauls. Easy maneuverability, electric controls, and big brakes are made for fast handling all through the cycle.

### "Move dirt cheaper"

Supt. Robert Smith added: "Tournapulls keep us ahead of schedule, move dirt cheaper than other rigs." Smith especially liked the way operators could use Tournapull's positive electric power-steer to pivot prime-mover from side to side where footing was soft. This permitted "walking" the drive wheels out of tough spots while making fast delivery of big loads to the fill.

### "Differential makes the difference"

According to Tournapull operator Tom Carder, "These 'Pulls are the only outfits that could do this job. Other rigs would get stuck. It's the Tournapull differential that makes the difference. I sure like 'em!" Carder has had thousands of hours at Tournapull's electric controls. He knows from experience how the power-proportioning differential helps pull through soft going, rides faster and easier on the turns, by automatically transferring power to the wheel on firmest footing.

Why not check with Tournapull owners to find out what these handy, high-speed dirtmovers can do for you? Or, ask for a demonstration on your job! Your LeTourneau-Westinghouse Distributor will be glad to help you in every way to get the real facts for yourself.

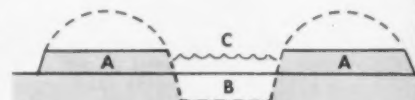
C Tournapulls load a mixture of light sandy silt and gravel from a canal cut and haul ¼ mile to build canal banks.



Canal-bed built by spreading thin layers of material, compacted by rolling action of the wide rubber tires of C Tournapulls.



One "C", equipped with tank, used full time to haul water to cuts and fill. Continuous watering helped scrapers get bigger loads out of cuts, aided in compaction of material on fill.



### "Economic fill material"

- A. Flat, compacted, road-like bed, about 2' high, 12' wide, built by Tournapulls.
- B. Average 3' ditch dug by dragline, dirt piled on sides to raise banks.
- C. Eventual water-line just below top level of compacted dirt

Tournapull—Trademark Reg. U. S. Pat. Off. P-901-A-b



## LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

# Firestone NYLON TIRES



## CUT DOWNTIME LOSSES AND REDUCE TIRE COSTS ON LARGE OR SMALL HIGHWAY CONSTRUCTION JOBS

TODAY'S fast highway construction timetables call for rugged, efficient earth moving equipment that is capable of top performance in all types of soil conditions.

Earth moving units, like the one illustrated above, will maintain better schedules and cost less to operate if they roll on Firestone Nylon Tires.

Firestone Nylon Tires are built for the toughest service. The treads give maximum traction and they

are extra tough to resist cutting. Double-thick sidewalls give added protection against cuts and snags.

Firestone's Safety-Tensioned Gum-Dipped nylon cord body gives greatest protection against impact breaks . . . flex breaks . . . heat failures . . . and water damage.

Let your Firestone Dealer or Store show you how Firestone Nylon Tires will cut downtime and increase the profits on any job.



**A TIRE FOR EVERY ROAD, LOAD AND CONDITION OF SERVICE**

GROUND GRIP GG WIDE BASE ROCK GRIP RG WIDE BASE ALL NON-SKID ALL TRACTION RIB EXCAVATOR

**WHEN YOU BUY NEW EQUIPMENT OR REPLACEMENT TIRES, SPECIFY FIRESTONE**

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. . . for more details circle 208, page 16

**ROADS AND STREETS, May, 1956**



## More work, in less time at low cost

Watch the smoothness of a modern Adams motor grader at work on ditch, bank or surface work. See how easily it picks up the load, how steady it blades at any work speed. Take the wheel, drive it as you would your automobile... through city streets, to 25 mph... in reverse to 13 mph. Stand or sit at the controls, notice how clearly you can see grade and load on the blade. With convenient and positive-working power-controls you raise, lower, revolve, or extend the blade to any desired position.

Look how heavy, box-construction, one-piece frame of this husky grader is built to resist shock and stresses. Grader weight is distributed to make use of full power in all gears. Big, powerful engine starts instantly in any temperature; develops power-to-spare, with lugging ability to move heavy loads in tough going. Note how constant-mesh transmission gives smooth progression of speed through all gears... no spur gears to clash.

### 8 Forward Speeds (up to 25 mph)

There is a speed for every grading operation. You get work done fast, and save time moving job-to-job. Three additional "creeper speeds"

(.23 to 1.82 mph) are optional. They make it easy to rip hard-packed roads and old asphalt, root out unseen roots and stones without severe shocks. Important also for accurate finishing in tight places. *No other grader offers this wide range of operating speeds.*

### 4 Reverse Speeds (up to 13 mph)

Wide range of reverse speeds saves time on shuttle-grading and mixing, backing to buck snow drifts, etc.

**Double-Action Hydraulic Brakes.** Service brake applies braking action to transmission as well as wheels; surer, safer stops are assured, and, with less pedal effort.

**Rubber-Mounted Engine** Vibration is not transmitted to grader to annoy and fatigue operator. Means more accurate grading, better end-of-day working or work efficiency.

### See ADAMS before you buy

Judge your next motor grader on the basis of *performance*. Ask your LeTourneau-Westinghouse Distributor to show you a modern Adams grader at work. Find out for yourself why Adams graders do *more* work, in *less* time, at *lowest* cost... why they make taxpayers happy!

### A size ADAMS for every need

**Model 330** — with 80 hp diesel engine. A sturdy general-purpose machine in the 20,500 lb. class.

**Model 440** — with 104 hp diesel engine, 21,500 lbs. A popular size for city and county use.

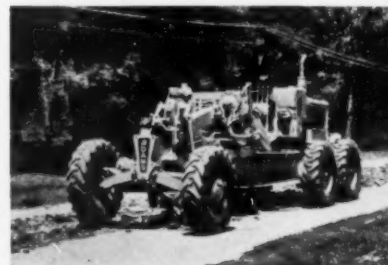
**Model 550** — with 123 hp diesel engine. Heavy-duty, all-purpose tool for heavy maintenance and construction. Approx. 23,500 lbs.

**Model 660** — with 150 hp diesel engine, 27,730 lbs. and up. For extra-duty construction. Does up to 30% more work than any grader you have ever used.

**TravelLoader** — A high-speed, heavy-duty, self-propelled, belt-type loader for picking up and loading into trucks from windrows or stockpiles. Write for details.



With dozer-blade (optional) Adams grader roots out brush, pushes debris off right-of-way, backfills around culverts, etc.



Rugged scarifier (optional) rips up gravel, crushed stone, blacktop, sheet asphalt road and street surfaces. Has longer-wearing replaceable points.

AG-2-P-b

A Subsidiary of  
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LeTourneau-Westinghouse Company

PEORIA, ILLINOIS



## earthmoving equipment . . . and **CF&I CUTTING EDGES**

Earthmoving equipment has played a major role in building America. Factories, farms, cities, railroads, and our present-day highway systems and housing developments have been built because of the tremendous amount of work that can be done by scrapers, graders, dozers and allied equipment.

These earthmoving machines must be equipped with highest quality parts to insure their durability. CF&I Cutting Edges answer this demand because of CF&I's rigid quality control through every stage of processing, from ore to finished blade. New billet, special analysis open hearth steel carefully selected for its toughness and resistance to abrasion is used.

You'll find that there's a CF&I Cutting Edge that's perfect for your job. They are available in a wide variety of lengths, widths, thicknesses and hole spacings; flat or curved, with beveled or square ends, and in several specified finishes. For complete details on the CF&I Cutting Edge that best suits your needs, contact our nearest District Sales Office.

3182

### CUTTING EDGES

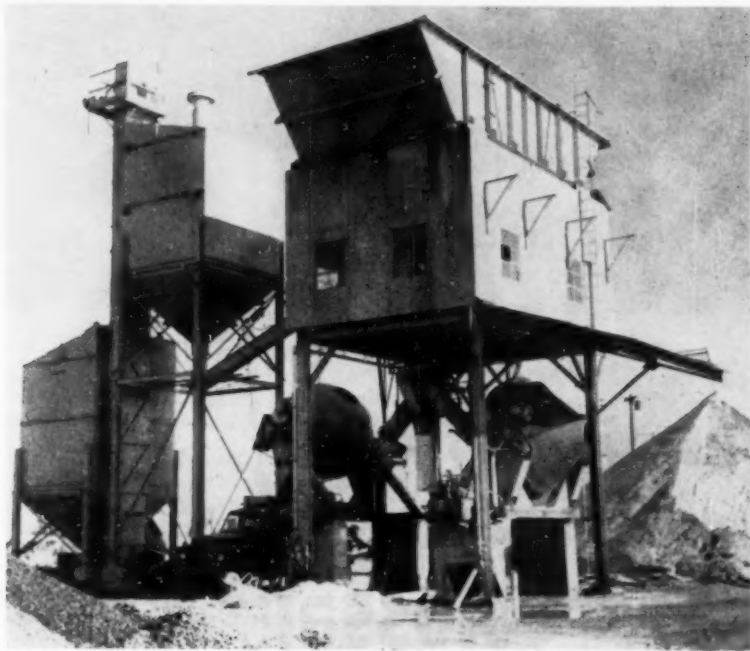
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. . . for more details circle 202, page 16

# Brewster's New All-Purpose Paving Plant



● New big-capacity multi-purpose concrete plant.

A PORTABLE concrete plant, designed to handle many types of operations, has been built for the George M. Brewster & Son, Inc., of Bogota, New Jersey. As pictured here, it consists of a unit designed by L. Burmeister Company, usable for central mix paving, central mixing for structures, dry batch paving, transit mix operations, mass pours and project pours. The plant is equipped with all necessary controls, scales and components to provide quality-controlled batching automatically. This type of plant can be built with capacity to handle up to 380 cubic yards per hour.

The Brewster plant with a height of 42 feet, includes two 4-cubic-yard mixers. (Mixers are available in sizes from one to six cubic yards for this type of plant).

The plant will have a 300-ton, 3-aggregate compartment bin, constructed with pins in place of bolts for quick knock-down for transportation. In this plant all starters are mounted in cabinets, with all plug-in connections on air cylinders. Gates are solenoid-operated for batching. Other components in the Burmeister design are slump meters, moisture compensator, over-and-under interlocks, presets, counters, timers and recorders.

## International Harvester opens new school

A modern, up-to-the-minute power service training program housed in 5,000 sq. ft. of floor space at International Harvester Company, Melrose Park, Ill., was inaugurated recently. At this occasion, Harald T. Reishus, vice president of the Industrial Power Division, dedicated the program before 24 service managers representing International distributors.

The initial school session was climaxed with a graduation dinner, at

which time students were each presented with diplomas by John W. Duncan, supervisor of service training.

The students spent a total of 49 hours during the week-long school learning the latest in assembly and dis-assembly of International equipment.

The new facilities at "Melrose Tech" provide every type of training needed to educate company and distributor service personnel. Special classrooms are available for the wide variety of training courses, a large auditorium permits showing of motion pictures and slide films. Also available at the new school is an injection pump lab, a photo lab, shop area for teardown, tool room, and space adjacent to the school for the display of complete units.

In charge of the new school program is Walter Black, general supervisor of service. Following the initial schools, a new service program will be started to cover other phases of servicing International equipment.

Highlight of the recent curriculum was the "Melrose Tech Service Training Courses," a series of streamlined "do-it-yourself" courses. This program, consisting of training aids, slide films, and manuals, permitted graduates to return to their distributor organizations and teach other service personnel.

Mr. Reishus, in dedicating the new facilities, said: "The importance of service cannot be exaggerated. Our manufacturing facilities are dedicated toward the building of a quality product and our engineering staff is working constantly in designing and developing products needed by the market. However, we must admit that most products offered in the market today are quality products."



● At International's "Melrose Tech." Open forums provide an opportunity for discussion of field problems with representatives of both the service and engineering departments.

### 8,500,000 Cubic Yards

Here is the great cut, completely unprecedented in size and at this stage still marked by uncertainties in problems and job methods. Work will get into full swing after a smaller 825,000 yd. hill is first largely removed.



## CONTRACTORS DIG IN ON "Super Colossal" Cut

By **Harold J. McKeever** Editor-in-Chief of **ROADS AND STREETS**

Sandstone and shale cut totaling 8,500,000 cubic yards to be handled largely with heavy rippers and scrapers. Part of a California freeway relocation which will require 17,000,000 cubic yards of excavation in 7.9 miles under two adjoining contracts.

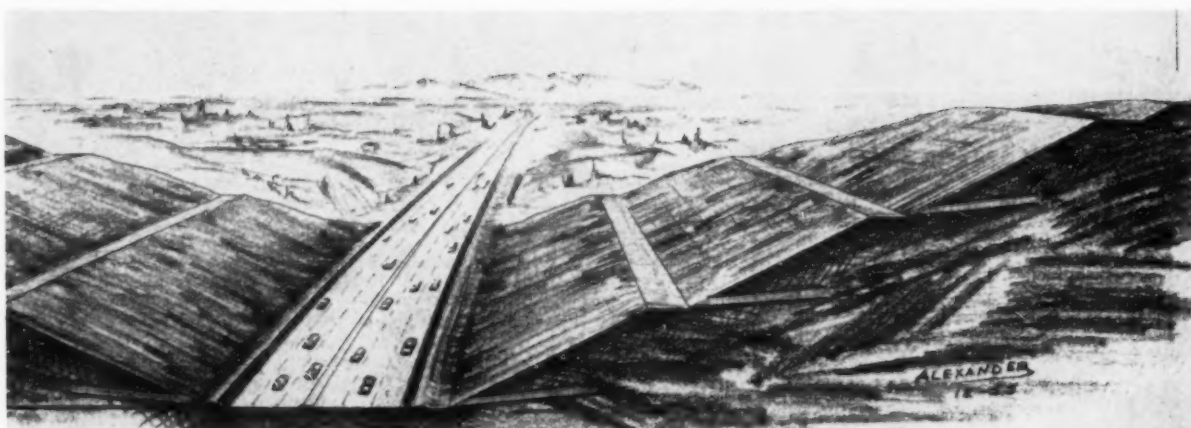


**I**N California this spring the contractors are in action on a huge notch in the skyline which will constitute — *five or six times over* — the largest single cut in U. S. roadbuilding history. Because of its great size, the unusual contract provisions involved, and the thorough advance geological and soils studies made in determining its feasibility — the "Big Cut" job is being watched with keen interest.

The cut is part of a contract in the amount of \$7,098,690 awarded December 27, 1955, to the joint venture firm of Ferry Bros., John M. Ferry, Peter L. Ferry, L. A. and R. S. Crow, of Glendale, California — hereinafter called Ferry & Crow. The contract covers grading, drainage, paving,

### Ripping First Rock

Heavy ripper with a Cat D9 is ripping sandstone during the first days of opening up the 825,000 cu. yd. cut next to the "Big Cut".



structures and related work for 2.9 miles of multi-lane freeway as a segment in the Carquinez Project.

● **The Carquinez Project.** First let us digress to glance at the Carquinez Project as a whole. The Carquinez Strait Bridge on U.S. 40 between San Francisco and Sacramento, built in 1928, is part of a growing bottleneck problem accentuated by waterways of the area. In December of 1955, a \$46 million bond issue was sold by the California Toll Bridge Authority to finance a series of coordinated contracts for new facilities. Four of these jobs, which were designed by and will be supervised by the California Division of Highways, have been awarded as follows:

1. The job involving the big cut, consisting of 2.9 miles of relocated U.S. 40 south of the present Carquinez Bridge, extending from Crockett to Hercules, California.

2. Deep pier foundations for a new bridge over Carquinez Strait, parallel to the present bridge, designed to form a dual system. Awarded to Mason and Hangar, Silas Mason Co., Inc., and F. S. Rolandi, Jr., Inc., at \$5,454,694.

3. The superstructure for this bridge (largest contract let to date by the California division of highways). Awarded to United States Steel Company at \$9,489,126.

4. The south bridge approach, together with an elaborate interchange system, connecting with the "Big Cut" project and other highways. Awarded to Peter Kiewit Sons Co., at \$4,661,462.

A fifth related contract has been awarded out of state gasoline tax funds, consisting of 4.9 miles of freeway extending on south from the "Big Cut" job. Awarded in January, 1956, to McCammon-Wunderlich Co., and Wunderlich Corporation, of East Palo Alto, California, this job includes

5,300,000 cu. yd. of roadway excavation, with one cut of 1,800,000 cu. yd.

The four bond issue jobs were advertised on October 14, 1955. Bids were opened, one project each day on November 28 through December 1. Because of the unusual magnitude of the work and the many special design features and contract provisions involved, the contractors were thus given six weeks to examine plans. Contracts were let late in December.

All four of the above bond-issue

contracts thus were timed to have the project opened to traffic by October 3, 1958. The freeway contract specifies working days and the three bridge construction contracts calendar days in expressing the time limits for which the contract should be completed. This gave the bridge contractors 1,010 calendar days during which time there were estimated to be 570 satisfactory working days for the freeway contract which figure is controlled by the grading operations.



● Why the big cut is needed. A 350-ft. hill is in the way of a streamlined relocation of U. S. 40 off the Carquinez Strait Bridge. Ferry & Crow contract section begins at the cut. Peter L. Kiewit Sons Co. interchange job lies between the cut and the water. The McCammon-Wunderlich roadway project connects with far end of Ferry & Crow job.



● Coming down the "little" 825,000 cu. yd. hill, toward Waste Area "A." This hill, which was opened up in an all-out yardage attack in March, must come out first so that a 9,000-ft. favorable grade can be established through it from the 8,500,000-cu. yd. cut located a mile beyond.

The liquidated damages on each of the contracts for failure to open to traffic in the stipulated number of working days or calendar days was \$7,900. And for the final completion of the total contract a penalty of \$500 per day was placed on the three bridge contracts and \$900 per day on the freeway contract. These smaller amounts are based on the estimated daily engineering costs, and the larger figure of \$7,900 per day is based on the anticipated net daily revenues from tolls.

The McCammon-Wunderlich freeway project (gas tax financed), awarded early in January, has a 560 working day limit.

The special contract provisions clearly emphasized these features and also warned builders that double-shift work would probably be necessary in meeting job schedules. The department based completion time on an estimated average number of working days per month ranging from 11 in January upward to 22 in July. A work day is defined as any day on which the contractor is able to have 60 percent or more of his normal force at work on the controlling element of the job. In the case of the "Big Cut" job, excavating will of course be the controlling feature.

● **Advance Studies.** Seven location lines were studied for the freeway approach to the new bridge, all of which would require either skirting or cut-

ting through the big hill immediately off the bridge. In conformance with California policy, the studies weighed the factors of first cost, maintenance cost, length of line, right-of-way cost, degree of disturbance of existing property, and local community service aspects. The commercial interest of Union Oil Company, through whose tank farm area the line would have to pass, was also a major consideration.

Another major factor was the cost of the multi-million-dollar distribution structure tying the road to the bridge; this had to be rough-designed and estimated for each location scheme studied.

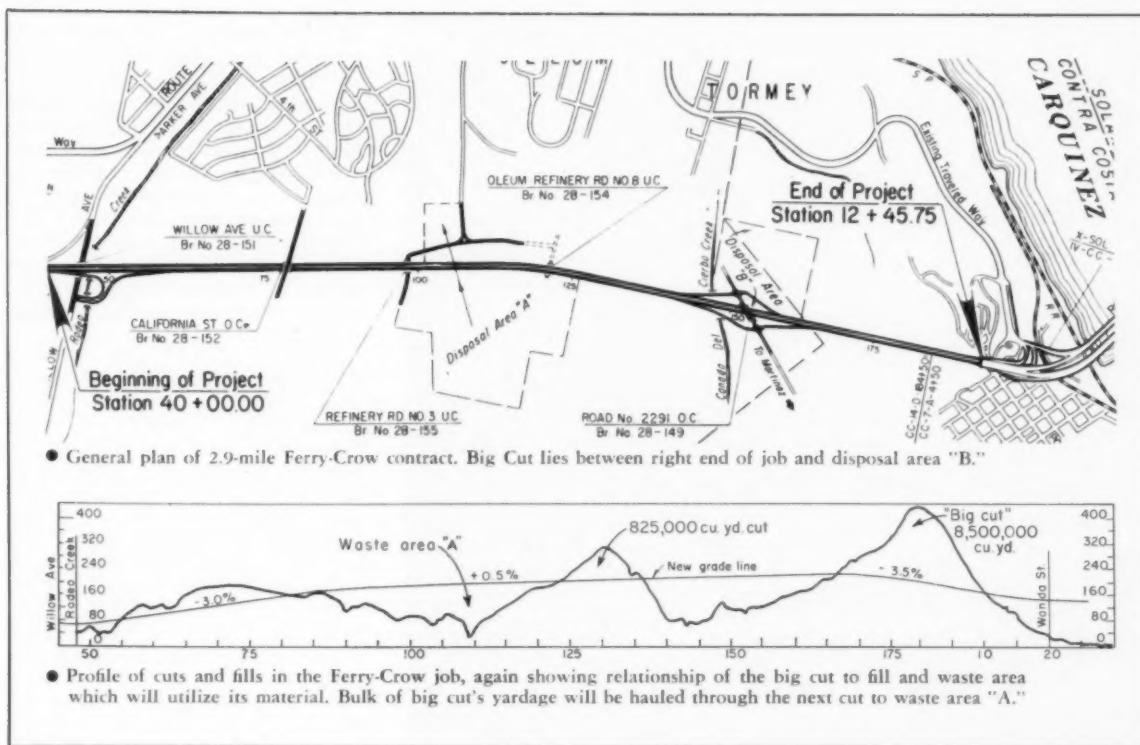
A tunnel was considered, but prov-

ed higher in cost than an open cut due to the necessity of heavy lining. The decision reached was to adhere to the highest standard of geometric design, cutting a direct route through the hill. The line selected cuts 2 miles off the present U.S. 40 route.

The feasibility for this unprecedented cut through faulted, unstable formations in a region of active earthquake history, hinged on the findings of an extensive subsurface study. Made under the direction of F. N. Hveem, engineer of research and materials, data on soils, drainage conditions and geological details were taken and reviewed by a team led by A. W. Root, Travis Smith and Eldridge Drew of the materials and research section.

**BEFORE** — Looking north along project, as work began on the preliminary 825,000 cu. yd. cut. In distance: hill where the "Big Cut" will be carved. Intervening valley to have deep fill. (ROADS AND STREETS Staff Photo)





Four-inch core borings were made with a state-owned Joy No. 250 rotary drill, using a double-tube core-barrel which produced relatively undisturbed samples. Eight holes were drilled at 300 to 800 ft. intervals along the centerline and at other selected locations over the 43-acre surface of the big cut area. Holes as deep as 300 ft. were drilled to elevation below the cut floor.

Supplementing the cores, the holes were studied by electrical logging to fill gaps in the data due to the intermittent nature of the core samples. The procedure was to lower a sonde

or electrode down the bore hole and record on photographic film continuous plots of resistivity and self-potential as the sonde descended. This was performed by the Schlumberger firm which specializes in such work for the oil industry.

Seismic studies attempted here were not satisfactory because of the faulted formations involved.

From these data a table relief model was made of the cut, visualizing the geological details. It was confirmed that the cut area is extremely faulted, including the so-called Franklin thrust fault and the Mare Island normal

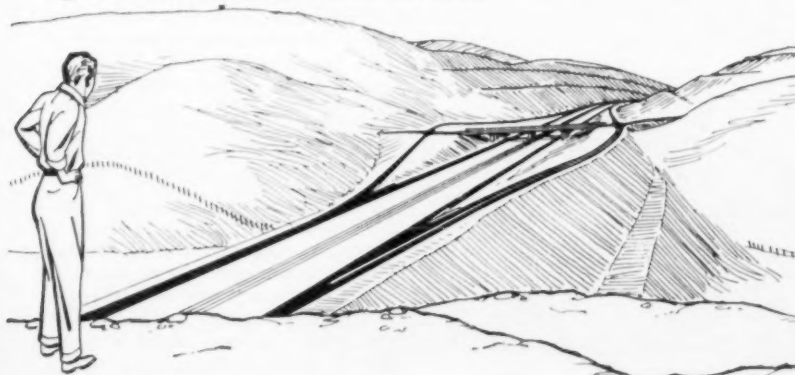
fault. Older Cretaceous sandstone and sandy shale are thrust over younger Eocene shale, and adjacent there are steeply upturned Miocene strata consisting of interbedded shale and hard sandstone.

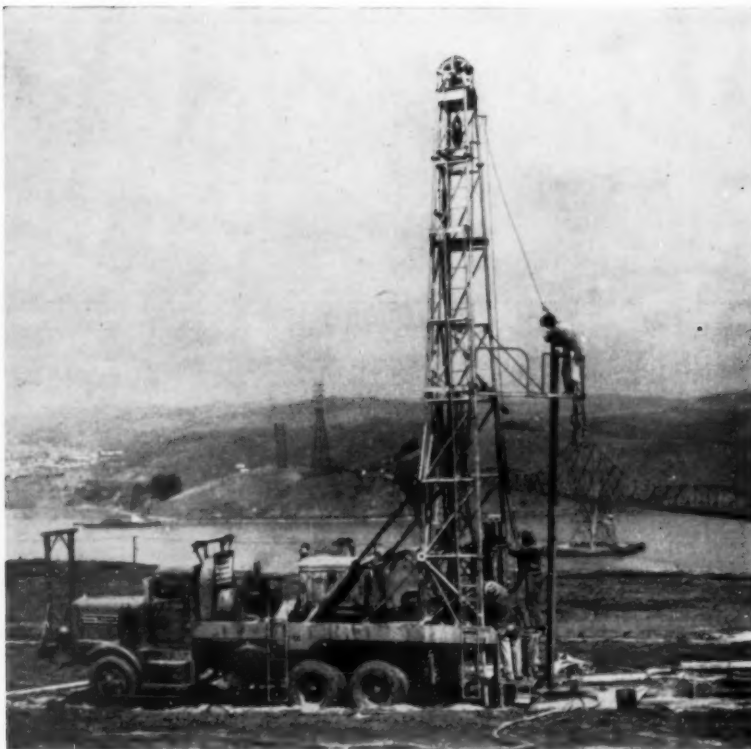
Drainage problems also were considered to be of controlling importance. Pumping and recovery data at the core holes showed very adverse ground water conditions, with percolation levels as high as 250 ft. above the cut floor.

● **Cut Design.** The data thus obtained, when related to local experience and earthquake history, definitely decreed a broad open cut with thorough drainage provisions. The design adopted provides room for two 36-ft. roadways, 9½ ft. outer shoulders, 2 ft. inner shoulders, 4 ft. raised median, a future added lane in each direction, and a debris trough in the bottom of the cut along each side. A design slope of 2:1 was adopted with 30 ft. benches at 60 ft. height intervals.

An important design provision, carefully spelled out in the contract, is the installation of 2-in. horizontal perforated drain casings laterally into the hill at locations and frequencies to be decided by the engineer as the excavation advances. The bid item was for 24,000 lin. ft. of such drains. The plan is to install the pipes in drilled holes "as is found necessary." The broad

**AFTER** — Artist's view of the completed six-lane freeway, as it will thread through the scene in the adjacent photograph. This unprecedented grading volume is justified by California highway engineers, who are committed to highest freeway standards for main inter-city routes.



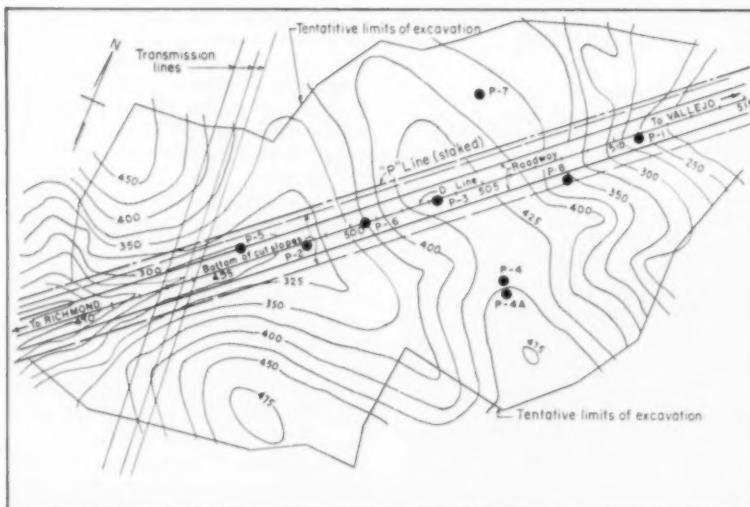


● Joy rotary drill rig used by California materials laboratory crew to put down bore holes over site of "Big Cut."

ditched benches will serve the double purpose of catching surface water and eroded materials from the slope intervals above, and of subsequently affording access for maintenance and inspection. Bench ditches will slope toward the north end to 18-in. corrugated pipe downdrains. The roadway will slope 3.5 percent downward northerly toward the interchange and

bridge. No plans have been made to develop ground cover for the cut.

● **Excavation.** The controlling excavation problem consists of getting the "Big Cut" yardage disposed of. Some 2,400,000 cu. yd. of excavation is specified to go into designated Waste Area "A", located about 1½ miles south of the big cut on the far side of an intervening 825,000 cu. yd. cut.



● Diagram of bore hole locations over area of the big cut.

Waste yardage is required to go into "A" until that area is brought up to specified grade; this will accomplish the filling up of an extensive ravine area as a future refinery site, agreed upon after extensive negotiation with Union Oil Company. The deal involved building up the site in return for right-of-way required for disposal of the waste yardage. Only such minor waste yardage as may occur in excess of 2,400,000 cu. yd. is designated to go into a closer Waste Area, "B", located immediately south of the big cut.

Thus the project, for reasons other than economy of earthmoving, shapes up into an "astronomical" overhaul operation. The 8,500,000 cu. yd. cut in combination with this long-haul disposal accounts for most of the probable 455,000,000 station-yards of overhaul in the project. The bulk of the haul from the big cut will be 8,000 to 9,000 ft., and the average haul for the entire job is estimated at 7,100 ft.

The strategy of the job hence clearly becomes one of (a) early cutting down the intervening sandstone and shale hill of 825,000 cu. yd., so as to eliminate adverse grades between the big cut and Waste Area "A"; and (b) developing the most economical means of ripping out the sandstone and shale from both cuts and toting it 1½ mile or so into place. Work in March and April was concentrated on the smaller cut, with expectation that the big cut would be started by late spring and other excavation and filling along the 2.9 miles could be scheduled in the over-all job plan.

For the ripping job, Ferry & Crow have settled on several Caterpillar D9 tractors equipped with heavy Ateco rippers. Rippers utilized in March, when the equipment started rolling, were each equipped with two H & L teeth which were expected to last only 6 to 8 hours in the abrasive sandstone. Much of the sandstone is loosely cemented, but some hard strata will undoubtedly require experimentation and possibly some shooting. Certainly the big sized tractors will save a lot of blasting here. D8s will also do ripping where conditions permit.

At the March "spring opening," Ferry & Crow worked 3 D9s, 18 Cat D8s, 15 Cat DW20s with No. 456 pans (built up to 22 yd. with sideboards), and a dozen or so LeTourneau-Westinghouse RU 23-yd. scrapers. The D8s pushloaded ripped sandstone on downhill grades as steep as possible, loading both the DW20s and the RUs which were drawn by D8s. The initial yardage was used to begin filling over corrugated pipe drains and sand blanket material, which will underlie the flanks of Waste Area "A".

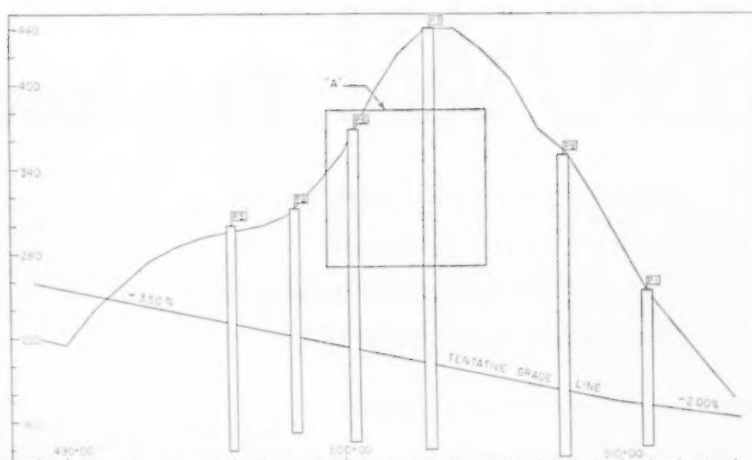
● **Tandem Scraper Operation.** This is all preliminary to the long, grinding job of moving that big cut, on which Ferry & Crow were expected to try tandem operation. Much advance interest was shown in this plan, which involves putting a second power take-off unit on each of several DW20s, and hitching an RU scraper behind. The operator would load first the No. 20 scraper, then the towed RU, then trundle the combined 40 or more yards of material to the fill — one operator and one tractor, instead of two.

Will this idea work and save money? Much depends on conditions encountered. Yes, with plenty of pusher service and a downhill load path, say those who claim to be in the know. L. A. and R. S. Crow, some years ago, used this trick profitably on a long-haul grading operation in Jackrabbit Pass. But as this is written anything can happen on this gigantic earthmoving job. Whatever the method or methods, a steady 30,000 cu. yd. over-all daily production (2 shift) is the minimum goal for this job including the big cut.

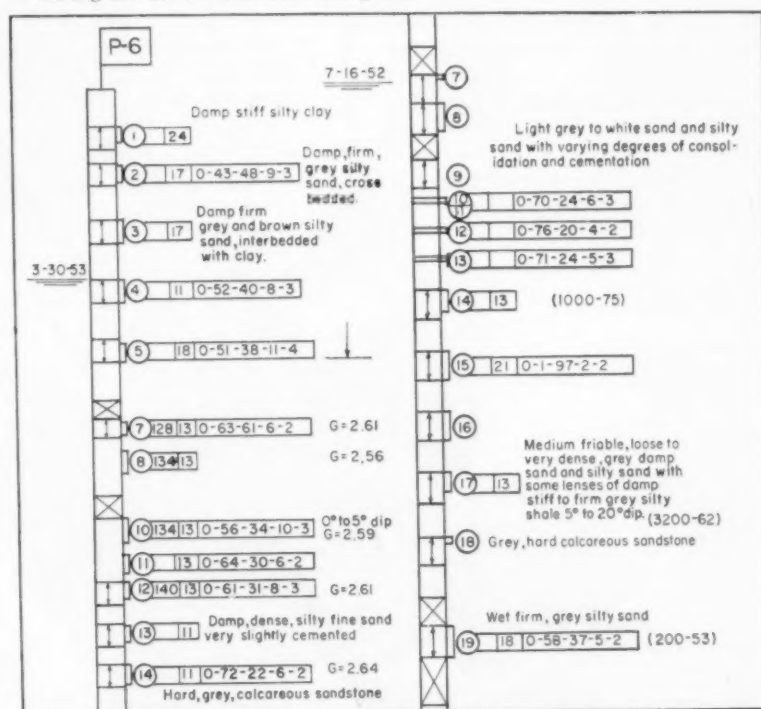
Another innovation is the plan to try out the new Hydratarder device (similar to torque converter) on the DW20s to ease down drag and save brakes on steep grades.

Other equipment on hand in March for the "spring opening" included two Cat 12 motor graders for maintaining haul roads, one Northwest  $\frac{3}{4}$ -yd. backhoe and two Lorain  $\frac{3}{4}$ -yd. draglines for cutting drainage channels. The controlling element at this stage was the installation of extensive corrugated pipe drains under embankment and disposal areas. Pipes were laid after scalping away muck, and covered by granular materials hauled by Reo 10x10's with 20-yd. bodies.

● **Embankment Construction.** The job includes embankment heights up to 160 ft. For compaction the contractor expects to depend at first chiefly on sheepfoot rollers drawn by heavy tractors, and possibly add heavy rubber-tired compactors. The excavation material in general will be of high quality, which with necessary blend-

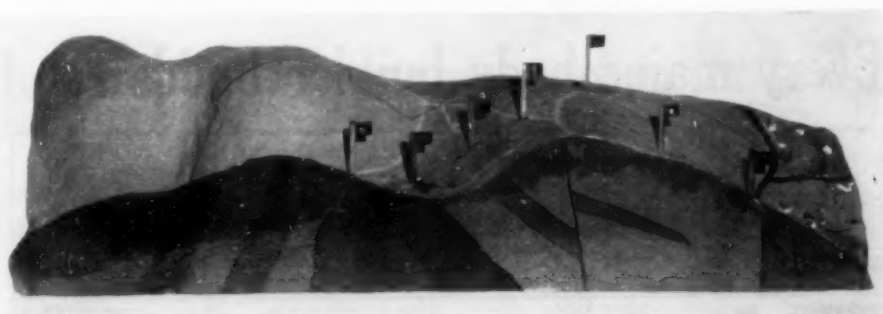


● Location of bore holes approximately along roadway centerline through the Big Cut. See below for detailed log data.



● Magnified portion of boring log sheet (see Detail A above), showing nature of data developed for feasibility and design studies. Circled numbers refer to core fragment number. Numbers in small rectangular areas refer to percentage material passing screen sizes.

● Table model of the main cut, built by materials laboratory staff to help visualize and study the geological problems. Note up-turned strata. Flags mark sites of core holes.



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**Up to 3000 lbs. more payload than other 6-wheelers!**

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Max. GVW: 42,000 lbs., GCW: 65,000 lbs.

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Tandem rear: 34,000 lbs. (17,000 each axle)

Payload: up to 32,160 lbs.

Wheelbases: 144, 156, 175, 192 inches.

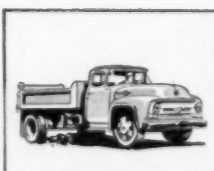
**Every major body builder builds for Ford . . .**



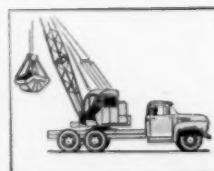
CEMENT MIXER TRUCK



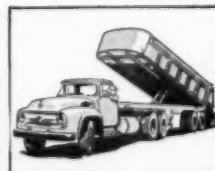
DUMP TRUCK



DUMP WITH SCRAPER



TRUCK-MOUNTED CRANE

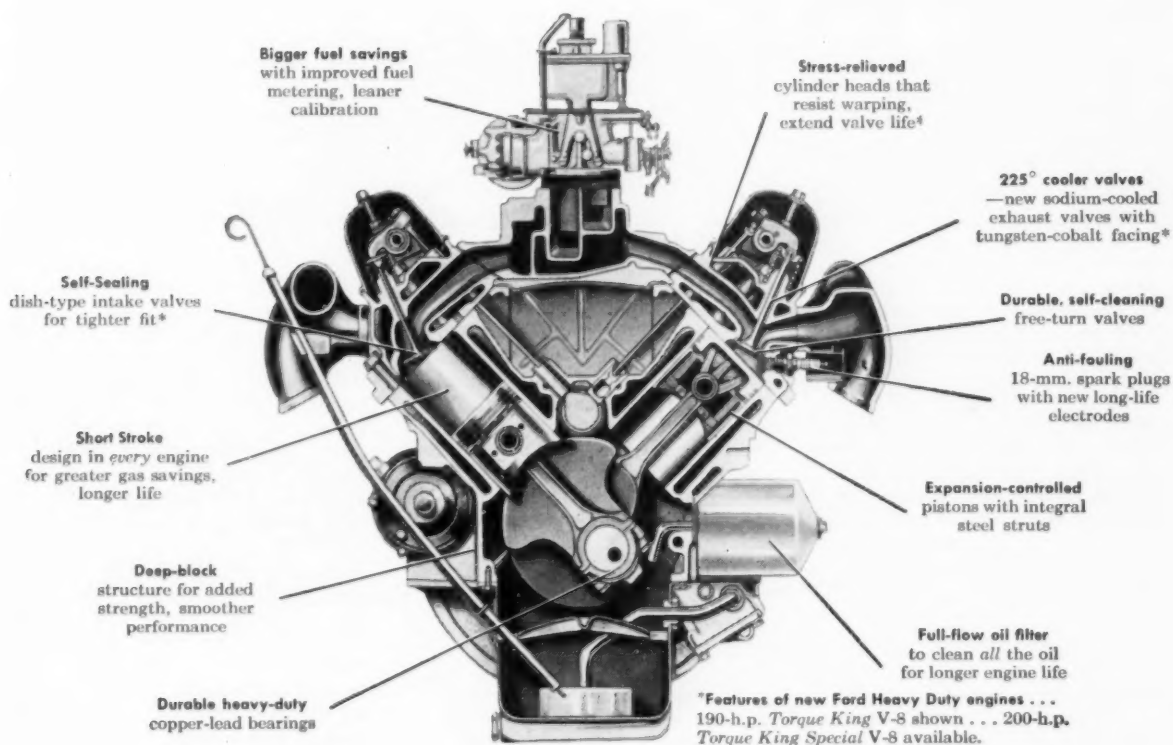


TRAILERIZED DUMP

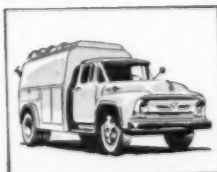
# Tandem in its class-Ford T-800

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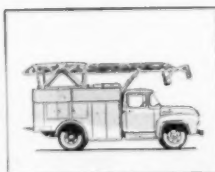
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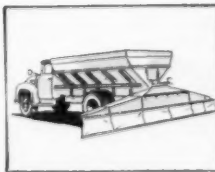
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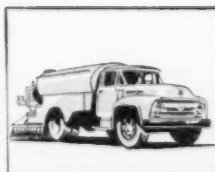
UTILITY TRUCK



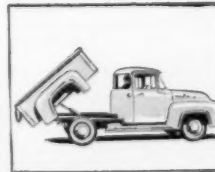
LINE TRUCK



LIME SPREADER

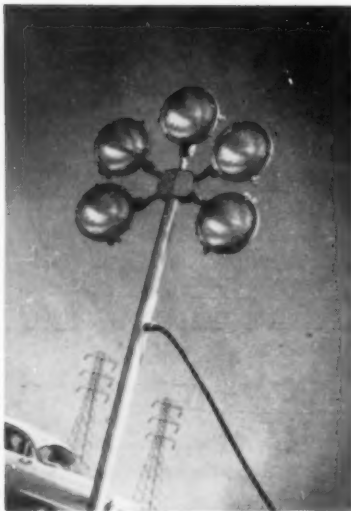


BITUMINOUS DISTRIBUTOR



LIGHT DUTY DUMP

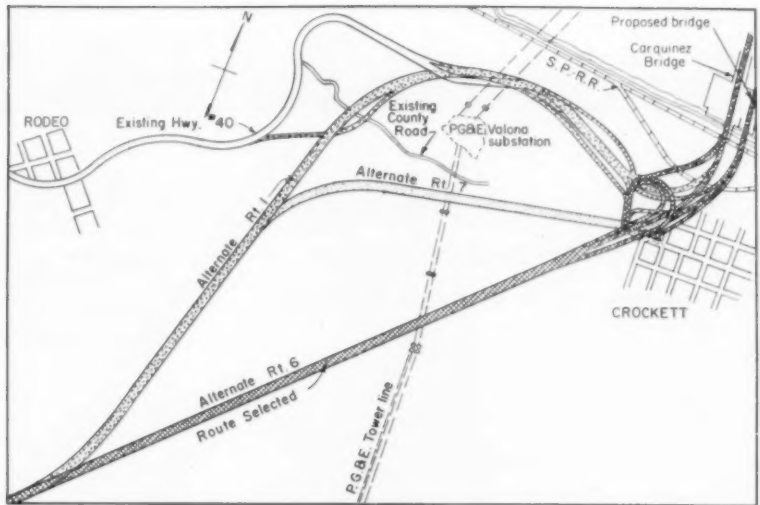
... for more details circle 212, page 16



● Double-shift operations will prevail throughout much of the Ferry-Crow contract, requiring plenty of flood-lighting equipment.

ing will entail no serious compaction problem. A Buffalo-Springfield Kom-compact also reportedly will be put on the job.

For this project, as with many California jobs today, the specifications waive the usual requirements calling for certain types of rollers and ratio of roller units to production. Instead, the contractor is allowed to secure compaction by his choice of methods. Most of the material is expected to break down sufficiently to permit placement in 8-in. loose lifts. Where more than 25 percent of the material consists of rock larger than 6 in., layers equal in thickness to the largest rock but not



● The route chosen for cutting through the big hill, one of several alternates analyzed for economic feasibility and engineering difficulties.

exceeding 3 ft. are permitted under California specifications.

In the deeper fills settlement platforms are to be placed at the engineer's direction, for observation of embankment behavior.

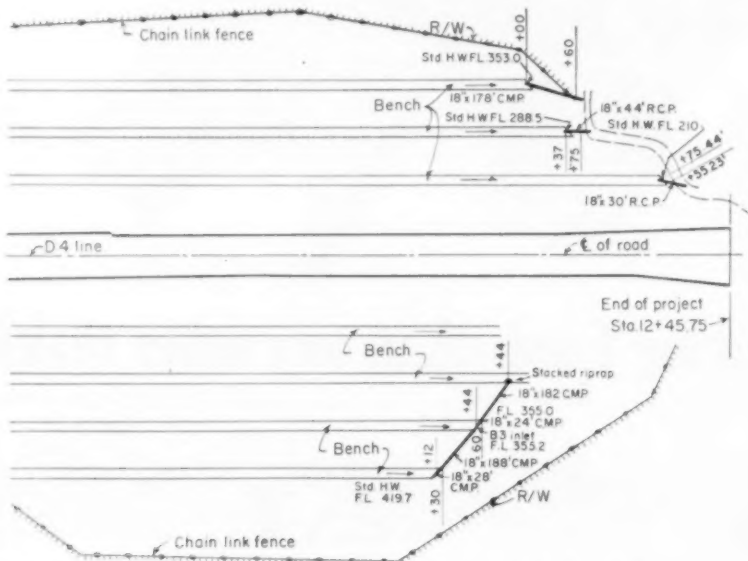
Compaction will be controlled by the Relative Compaction Test, as adopted by the California division of highways in 1945. Material having a Sand Equivalent of less than 25, as determined by the California standard procedure (except within 2 ft. of finished grade) must be compacted to 90 percent as measured by the state's so-called Five-Layer Method of test. Material exceeding 25, structural backfill, and material in the top 2 ft.

of fills, must be compacted to 90 percent as determined by the Ten-Layer Method.

The Ferry & Crow job, and also the McCammon-Wunderlich project to the south, which entails one 1,800,000 cu. yd. cut and much other yardage, have many other points of interest. The latter organization began in March with 2 Cat D8s, 3 D9s, 10 DW20s and 2 International TD24s, the latter for dozer and pusher work. McCammon-Wunderlich is said to be considering a special 60,000 lb. single-tooth ripper, to be drawn by four or five very large tractors, for getting out sandstone. This contractor's work entails stockpiling selected high grade sandstone for base course, some of which will be crushed. Both jobs contain large footages of culvert and drain pipe, including several long 84 and 96-in. corrugated plate pipe structures.

Ferry & Crow have sublet structural concrete and paving to Gordon H. Ball, of San Ramon, California. McCammon-Wunderlich has sublet certain structural work involving prestressed, precast members to Basalt Rock Co., of Napa, and electrical work to Engineering Design Co., The paving, which will be done in 1957 and 1958, may be batched from a plant jointly set up to serve the two roadway contracts — another of the many details still in the rumor stage on this widely discussed project.

● **Project Administration.** A word should be said on the special administrative set-up for the project. The California Toll Bridge Authority authorized bond issues not to exceed \$80,000,000 for the construction of



● Plan view of benching details in main cut, showing also the downdrains.



● Early yardage was obtained by Ferry & Crow at various locations, utilizing Caterpillar DW20 scraper units with D8 and D9 pushers. Note rocky soil everywhere.

two toll bridges across Carquinez Strait, one parallel to the existing Carquinez Bridge and the other between Benicia and Martinez about 6 miles upstream.

Because of the magnitude of this total bond project which will eventually include about 9 contracts on the Carquinez Bridge and about 5 contracts on the Benicia-Martinez Bridge, F. W. Panhorst, assistant state highway engineer in charge of bridges, assigned L. C. Hollister as project engineer to coordinate activities of the two toll bridge projects.

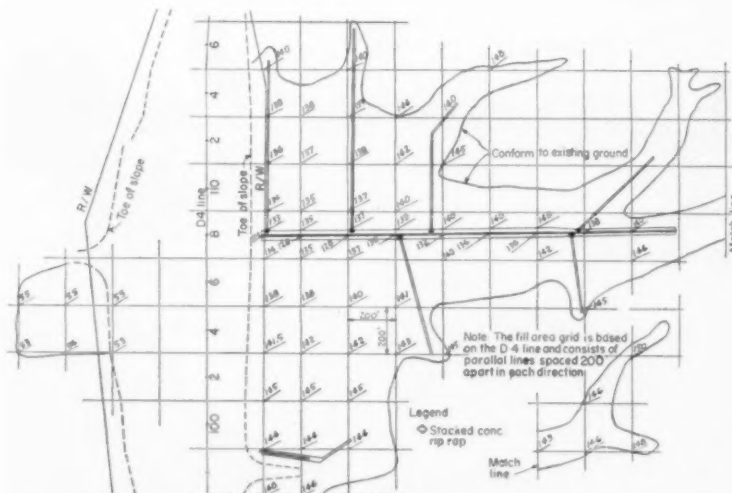
It will include work under B. W. Booker, assistant state highway engineer of District IV, for the approach freeways to the south of both bridges, and J. G. Meyer, district engineer of District X for the approach freeways to the north of both bridges, and the activities for the toll plazas and toll collection equipment for both structures.

Under the San Francisco district, with L. A. Weymouth, district engineer (operations), Vincent Smith is senior highway engineer on the highway phase of the approach work. Charles P. Sweet, Jr., is resident engineer on the Ferry & Crow contract, Loren Krueger on the Peter Kiewit Sons' contract, and Frank T. White on the McCammon-Wunderlich contract. Oscar Johnson is bridge department

representative of structure phases of the main Carquinez Bridge and approach spans contract. George T. McCoy is state highway engineer of California.

The superintendent for Ferry & Crow is R. C. Filbert; and for McCammon-Wunderlich, Floyd Helm.

During the first quarter of 1956 California state highway construction costs were up 16.0 percent over the first quarter of 1955, and 10.1 percent over the 1954 quarter. The Index now stands at 219.5 (1940=100), or 3.2 percent higher than the fourth quarter of 1955.



● Waste Area "A" involving 2,400,000 cu. yd., will fill a ravine to 160 ft. maximum depth. Shown here are part of details given the contractor.

## Upham-Porter-Urquhart Head

### Honduras Road Development

The engineering joint venture firm of Upham and Porter-Urquhart Associated, of Washington, D. C., and Newark, N. J., has been engaged for a 3-fold program of highway development in the Republic of Honduras. This firm's assignment covers the following:

1. Reorganize the highway department.

2. Set up a modern road maintenance department, complete with adequate repair shops and a training and developing program to acquire both personnel and proper machinery for maintaining the entire highway system of the nation. The system includes 2,500 kilometers of highway, counting the Pan-American Highway.

3. Make location studies and a preliminary engineering and cost report for two major highways. One will connect Tegusagalpa and Porto Cortez; the other will run between San Pedro Sula through Santa Rosa to the El Salvador border. Most of these two roads, which will be 550 Kilometers in length, will traverse the mountainous terrain of Honduras.

The U. S. Bureau of Public Roads does not have jurisdiction over this project, for which a \$4,200,000 loan by the World Bank will cover the engineering studies and acquisition of the initial equipment fleet.

The project is being manned by a resident staff of engineers headed by Paul O. Harding, who retired recently as assistant state highway engineers California at Los Angeles. Under Harding is William Fahey, who has retired as district engineer of the California Division of Highways at Los Angeles, who will serve as principal maintenance engineer, and Herbert M. Corn, transferred from the consultant's Newark office, as principal design engineer.

Other staff members include Walter Ritchel from California, equipment engineer; John Copitsky, formerly with the California state highway equipment staff at Sacramento, as assistant equipment engineer; Vernon Halstead, from the Porter-Urquhart McCreary & O'Brien organization, as engineer; George Howarth, bridge design; Frank Tipping, road design and materials engineering.

Additional staff being assigned includes a full time accountant, a consulting highway auditor; C. A. Bennett, geologist, from the San Francisco office of the consulting firm, and R. S. Bodwell, chief of soils and senior designer, from the Newark office.

Paul H. Stafford, chief of planning at Newark, will be project engineer in charge of the preliminary engineer-

ing studies. Leonard C. Urquhart will serve as consultant on the major bridges, B. D. McCreary, geology, and Charles M. Upham and O. J. Porter on the other features of the project.

#### Training based on film slides

An in-service training program based almost entirely upon visual aids has been developed by The Pennsylvania Department of Highways.

Using over 1,200 slides and three motion pictures, an 11-man crew of instructors and audio-visual specialists last month held the first of what will become annual state-wide seminars. In two-day sessions held around the state, in division headquarter cities, the "professors" covered such subjects as drainage, bridges, bituminous surface treatment, clearing and grubbing, excavation, concrete patching and bituminous concrete. Each lecture was built around a sequence of 35-mm color slides projected on a screen. There were no formal papers.

Top-notch, imaginative photography held the interest of audiences usually averaging 170 men at each session. F. C. Witkoski, director of research and testing, and Ercole Aciri, chief photographer, were responsible for developing the series. Some slides were drawn from Mr. Aciri's library of more than 3,000 photographs, but most were taken specifically to illustrate points instructors put across.

The switch from formal papers to the heavily illustrated talks was enthusiastically hailed by the men in attendance. Mr. Witkoski called the experiment "highly successful." "This is the cheapest training technique we know of," he said. "And good photography almost puts the audience on the scene. These men are learning from what the instructor says, but they are learning more from what they see."

#### Precast concrete block for slope protection

In constructing the toll bridge over the Ohio River at Shawneetown, Illinois, extensive fills were required on the Kentucky side of the bridge.

To protect the slopes of these fills, the Kentucky Department of Highways specified the use of precast concrete blocks, with dimensions of approximately 6 in. x 12 in. x 18 in., using Class "B" concrete. 71,000 sq. yd. of slope protection were furnished at about \$4.77 per sq. yd.

Blocks were carried up from an elevation 2 ft. beneath the ground surface. In event rock was encountered, the plan indicated the first course of block to be notched in for toe anchorage.

● Precast concrete block slope wall in place on Kentucky side of bridge.



# Final Research Published on Roadside Project



• Developing proper vegetative cover along roadsides has become a \$64,000 matter. The New York research has done much to clarify existing knowledge on the subject.

**A**N important research has been concluded on roadside vegetative cover, the findings of which are embodied in an elaborate and notable report. This report entitled, "Roadside Vegetative Cover — A Research Project" has been issued by the Landscape Bureau, New York State Department of Public Works, Albany, N. Y. The project, financed with state and federal highway funds, represents research carried out under the direction of Nelson M. Wells, Landscape Bureau Director for the State of New York, and under the immediate supervision of Harry H. Iurka, in conjunction with H. A. MacDonald, Research Agronomist, Cornell University, and F. E. Bear and H. C. Nikola, Research Soils Engineers with Rutgers University. Nineteen consultants, representing many diverse organizations and interests, aided in the project.

This study was launched in recognition of the growing magnitude and complexity of the roadside landscaping and maintenance phase of highway and street work. The purpose was to determine the most economical methods of establishing and maintaining vegetative cover on the roadsides in New York State, the climates and soils involved being considered representative also of those existing throughout the northeastern region of the United States.

Personnel of the Landscape Bureau, in cooperation with consultants, compiled all available data and inspected large selected areas over the state, the first year's effort covering 88 representative installations constructed since 1940. The areas selected for study in general were those that demonstrated some economical meth-

od or practice without reference to whether or not the results had been satisfactory. A few were chosen because expensive practices used on them provided important comparisons. A uniform basis for securing data on site objectives, history of construction, maintenance, performance and appraisal of results obtained was used in each area.

Following a preliminary report in 1953, 31 additional sites were investigated and a second report issued in 1954. The third year of the study emphasized soil-moisture relationships and sought the development of a "yardstick" for measuring the suitability of soil material at hand for the purposes intended.

Conclusions contained in the report are as follows:

## General

Construction operations often result in greater variation of soil conditions affecting plant growth within a highway project than those that occur naturally in wide-scale geographic variation.

## Soil

1. Good vegetative cover has been established without the use of topsoil, even on B-horizon, C-horizon, fill, and "made" soils and on mechanically stabilized soils of the northeastern United States.

2. Texture, structure, and moisture relationships are the three chief criteria in measuring the suitability of soils for vegetative cover, structure being most important for those that are predominantly clay and/or silt and texture and moisture relationships for those that are sand and/or gravel.

3. The percent silt-plus-clay of a soil material can be used as a measure of its suitability for the establishment and maintenance of roadside cover.

4. Soils containing less than five percent silt-plus-clay require use of special techniques for establishing and maintaining cover.

5. Satisfactory vegetative cover has been established and maintained on soils at all levels of silt-plus-clay above five percent.

6. More maintenance fertilizing is generally required on sites with soils having between five and twenty percent silt-plus clay than on those where the silt-plus-clay content is higher than these values.

7. When moisture supplies are consistently too low for growth of turf plants, as is often true of sands, cover will not be maintained regardless of other soil factors.

8. Mulches and amendments are generally required on sands, but good cover can be established and maintained when sands are so amended. Inorganic amendments are generally less expensive and equally as effective as the organic types.

9. Satisfactory fertility levels can be attained in virtually any soil by proper liming and fertilizing.

10. Where construction involves use of soil that is very low in plant nutrients and includes mulching with low-nitrogen organic materials, higher than normal rates of application of fertilizer are recommended.

11. Incorporation of organic matter into the soil is not essential for the establishment of turf, except under very unusual circumstances.



● Erosion like this can be prevented at great saving in highway funds, with beautification in the bargain.

12. The choice between amending a soil and placing a selected soil is determined not only by the original costs but by those involved in maintenance.

13. Field observation, combined with experience under similar conditions, usually provides sufficient information to determine the native quality of the soil in relation to the growing of vegetation.

14. Maintenance of good vegetative cover requires that attention be paid to maintaining nutrient supplies at adequate levels. Much more attention must be given to this problem on sandy soils than on those having relatively high silt-plus-clay values.

15. Although organic matter in the soil is a valuable aid to the establishment of vegetative cover, successful grass stands were obtained at levels as low as 0.5 percent. Once grass is established it generates its own organic matter in the soil.

16. Large savings can be effected by omitting the use of hauled-in topsoil. Bid prices for topsoil range between \$3 and \$7 a cubic yard. The 800 cu. yd. required an acre for a six inch depth would cost between \$2400 and \$5600. Even for the poorer soils that might require annual fertilizing, yearly maintenance costs an acre would be only about \$14 for material and \$10 to \$15 for application and the total cost over a 20-year period would not be over \$580. Thus, when fertilizer is used instead of topsoil, there is a minimum saving of \$2000 an acre. There are few topsoils naturally so productive as to require no fertilizing, so that the saving from omit-

ting topsoil is even greater than that indicated.

17. Good soil existing on a job should be utilized as far as possible. Economies of over \$1 a cu. yd. can be effected, however, by including the saving and placing of this material under the pay item of unclassified excavation. This has been done on contracts in the Babylon District of the New York State Department of Public Works and is handled in a similar manner in the Civil Aeronautics Administration's Specification P-152.

18. An important advantage in the use of subsoil as a growing medium is its lower weed-seed content, which means less competition in establishing a stand of desired turf.

#### Nutrient Requirements

19. Fertilizer should be applied during construction in sufficient amounts to supply adequate nutrients for the range of soils and soil materials within a project, having in mind that these may vary more as a result of grading operations than because of differences in soil series.

20. The desirability of applying nitrogen during construction at rates between 50 and 90 pounds an acre was well demonstrated. The relatively low cost of the other major elements compared with that of nitrogen, and the satisfactory results obtained with a wide range of complete fertilizer grades, led to the conclusion that the least expensive grade that will furnish the desired amount of nitrogen is the one to use.

21. For turf establishment on roadsides, fertilizer is as effective when

applied on the surface as when incorporated in the soil.

22. Good cover was established and maintained at pH values varying between 5.5 and 7.5. Values below 4.5 usually had a detrimental effect on the establishment of vegetative cover. However, lime should be applied for turf only when soil tests and experience with the soils involved indicate it is necessary. For example, Kentucky blue grass grew well on Munising sandy loam at pH values between 4.0 and 4.5.

#### Stability

23. Vegetation will not provide stability to a soil structure that is not in itself stable.

#### Sodding

24. Sodding is not essential for erosion control except where an immediate turf cover is required. Bids recently received by the New York State Department of Public Works on sodding varied between \$0.80 and \$2 a sq. yd., the average being \$1.19 a sq. yd., or \$5,700 an acre. As good results can be obtained by seeding, at a saving of at least \$5,000 an acre and without increase in maintenance cost.

25. Where sodding is required, it is no more necessary to use topsoil than for establishing grass by seeding.

#### Planting

26. Planting woody plants for erosion control costs at least \$2,400 an acre, based on the very low price of \$0.50 a unit and a spacing of three feet on centers. Seeding methods provide better immediate cover and as good permanent cover, with savings of at least \$2,000 an acre for establishment. Even if fertilizing should be required every year for 20 years, the saving would still be at least \$1,400 an acre.

#### Seeding

27. One of the major causes of high bid-prices for seeding received by the New York State Department of Public Works was the requirement that humus be incorporated in soil at a cost between \$7 and \$10 a cu. yd. or between \$700 and \$1,000 an acre. Fertilizing would have done a better job at less than half the cost. Another cause was a seeding specification requiring many operations, particularly those involving much hand labor, and the use of rates of seeding that were far in excess of those required for a good stand.

(Continued on page 107)



## Another Way to HARD-FACE CRUSHER JAWS WITHOUT DISTORTION

A good many operators of crushing equipment consider the hard-facing of jaws a mighty ticklish job; the bugaboo being distortion resulting from welding heat. But H. D. Sutcliffe, maintenance weldor at Buell-flat Rock Company in Solvang, California, has a good answer to this problem. Perhaps his method will be applicable to your operations.

Mr. Sutcliffe has a large rack on which he places a number of spare crusher jaws or segments side by side. During the course of the day skip welds are applied from jaw to jaw as time allows, using Stoodly Moly-Manganese for rebuilding and Coated Tube Stoodite for the final

passes. In this way welding heat is never permitted to build up sufficiently to cause warpage. The Moly-Manganese deposits are peened and wire brushed as they are laid down. By the time the jaws on the rack are finally rebuilt and hard-faced, it is time to remove the worn jaws from the crusher, setting them up for the same rebuilding treatment.

Wear on the crusher is checked at frequent intervals and plates are removed for rebuilding before serious wear occurs. With this procedure it is rarely necessary to buy replacements. The company's experience is that Stoodly Moly-Manganese and Coated Tube Stoodite are

regularly giving 2 to 3 times the wear of other materials previously used.

Your Stoodly dealer (consult the yellow pages of your telephone directory) will be glad to give you descriptive literature on all Stoodly alloys, and a copy of the Stoodly Guidebook covering maintenance of all types of heavy equipment. Or you may write to the company.

**STOODY COMPANY**  
11925 East Slauson Ave.  
Whittier, California

... for more details circle 256, page 16

**ROADS AND STREETS, May, 1956**

# BEHIND QUALITY



The New York City Water Supply Co. uses these 2 yd. Lima Type 802's (above and at left below) to quarry rock near Neversink, N. Y. Lima quality really pays off in low downtime on tough digging jobs like this.

## These LIMAS dig and load rock fast... and stay on the job day-in and day-out

It takes a really rugged machine to dig and load rock day-in and day-out. That's why thousands of users depend on Limas—like the Type 802, 2 yd. shovel shown here—to handle their toughest rock jobs. They know that Lima quality guarantees them the extra-rugged construction needed for high output, low downtime, money-making operation.

It will pay you to get the full story on the complete line of quality-built Limas. Find out today how you can get maximum performance and operating economy—with a Lima. See your nearby Lima distributor, or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

**COMPARE QUALITY!** No other machine gives you as much as LIMA!

1. Piston-type dirt seal rings and retainers in crawler rollers.



2. Moving parts are flame or induction hardened for longer life.
3. Main machinery is placed well back of center of rotation.
4. Anti-friction bearings at all important bearing points.
5. Big capacity drums and sheaves are easy on cables.
6. Torque converter (optional).
7. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

**COMPARE** and you'll specify LIMA for shovels (1/2 yd. to 6 yds.), cranes (to 110 tons) and draglines (variable). Smaller capacities available on rubber.

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... for more details circle 185, page 16



## **F.M.D. Tractor-Loader handles up to $\frac{5}{8}$ -yard loads, priced hundreds of dollars less than other diesel rigs**



**F.M.D. Tractor and Digger** cuts costs of laterals, footings, service lines. Fast, positive hydraulic control. Fordson Major Diesel equipped with both rear-mounted backhoe and front-mounted loader makes an efficient, low-cost unit for excavating, loading, backfilling.



... for more details circle 211, page 16

**ROADS AND STREETS, May, 1956**

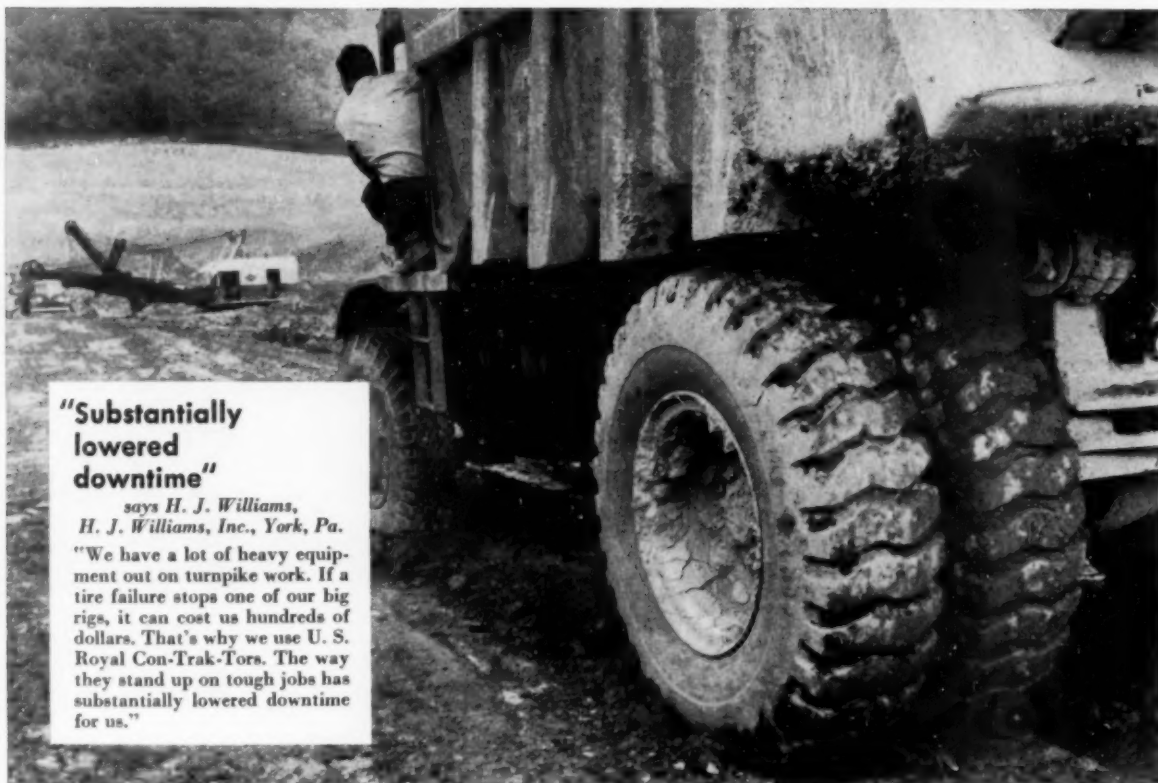
The powerful Fordson Major Diesel and new "Step-On" Loader handle production loading at lowest cost. See for yourself!

**Check workability**—One easy step puts the operator into the seat, ready to work, fast. At his command are scientifically placed levers for instant hydraulic control of  $\frac{5}{8}$ -yard or  $\frac{1}{2}$ -yard heavy-duty buckets. A touch of a lever and double-acting cylinders on lift arms and bucket deliver positive down pressure . . . over two tons of breakaway power . . . 2000 lbs. load capacity at full lift. Tilt back crowds maximum loads into the bucket. There's less spillage on the haul . . . parallel linkage of lift arms keeps bucket level, makes loader adaptable for fork lift work. For faster, more efficient truck loading, there's ample lift and reach to work from one side and still distribute loads evenly in high-bodied trucks.

**Check price**—You'll find the F.M.D. Tractor-Loader priced hundreds of dollars less than other diesels with comparable power and equipment. You also save on operating and maintenance costs. To get the complete story on this low-cost production loading team, call your Ford Tractor and Equipment Dealer, or write to the address below.

**TRACTOR AND IMPLEMENT DIVISION  
FORD MOTOR COMPANY  
Birmingham, Michigan**

# Costly Downtime Drops!



**"Substantially  
lowered  
downtime"**

*says H. J. Williams,  
H. J. Williams, Inc., York, Pa.*

"We have a lot of heavy equipment out on turnpike work. If a tire failure stops one of our big rigs, it can cost us hundreds of dollars. That's why we use U. S. Royal Con-Trak-Tors. The way they stand up on tough jobs has substantially lowered downtime for us."

Approach to south portal of T. J. Evans Tunnel, on the Pennsylvania Turnpike near Allentown.

## U. S. ROYAL

**NYLON**  
**CON-TRAK-TOR**  
**FULL LUG**

If, like Mr. Williams, you use heavy-duty trucks, you can reduce your equipment downtime and your operating cost with the U. S. Royal Con-Trak-Tor. Here is why.

This tire's *Nylon cord carcass* stands up to vicious shocks, fights off sharp rocks and snags. It has *triple impact protection*—extra cushioning rubber between plies, double shockpads under the tread, extra-tough construction at the crown.

Its *full-lug traction* pulls right through toughest going, reduces sideslip to an absolute minimum, just won't bog down.

Your U. S. Royal Dealer now has the U. S. Royal Con-Trak-Tor in your size. Have him put it on your wheels—and prove to yourself why men like H. J. Williams report that both downtime rates and operating costs *drop* with this great tire!



## United States Rubber

... for more details circle 290, page 16

## Roadside Project Report

(Continued from page 102)

### Seedbed Preparation

28. A fairly rough seedbed, with enough loose soil to cover the seed, usually meets all the requirements. This condition usually obtains immediately after grading, without additional tillage. Surface crustings should be broken by light tillage. The degree of surface finishing depends on the kind of maintenance to be employed. No cultivation is necessary when mulch is used.

29. Rolling is not required for establishing a seeding on most soils. Germination is quicker and more uniform on soil that has been firmed following seeding on soil fluffed during seedbed preparation.

### Kinds of Plants

30. Grasses meet all the requirements for roadside vegetative purposes as defined in this project.

31. The low-growing and late-maturing perennial grasses are the most desirable requiring little maintenance.

32. Grass species should be selected that are adapted to the soil, climate, nutrient, and lime factors that obtain the roadside requirements to be met, and the type of management to be imposed.

33. Seed mixtures need contain only a few grasses that are adapted to the conditions of the project. Red fescue, redbud, Kentucky bluegrass, and ryegrass have wide adaptation throughout New York State. For sandy soils, Kentucky bluegrass should be omitted.

34. Legumes are not necessary for roadside use, but certain species make good cover in themselves.

35. Rapid-growing cereal "nurse crops" provide quick temporary cover but, if seeded at high rates, may injure the stand of permanent grasses. They tend to be "competitor crops" and to interfere with the rapid establishment of desirable perennial grasses.

### Seeding Method

36. The method of seeding is of less importance than the time of seeding, fertility status of the soil, the seed coverage, and the moisture conditions.

37. The preferred depth of seeding is one-quarter and one-half inch.

38. Seed coverage, either with soil or light mulch, usually gives better results than surface and uncovered seedings. Seeding on existing open or temporary vegetation without working the soil has given good results.

### Time of Seeding

39. Fall and early spring seedings give the best results. Unless mulch is used, late spring and summer seedings are risky, due to drouth conditions.

### Mulching

40. Mulch, when employed at a light rate on surface seeding, often gives results equivalent to or better than soil-covered seedings. Mulching may be dispensed with when seeding is performed during favorable seasons and where its erosion-arresting properties are not required. Hay or straw mulch must generally be anchored to prevent loss by wind, or air disturbance by traffic.

### Maintenance

41. Maintenance is the most important controllable factor in obtaining and retaining satisfactory turf.

42. The fertility level of the soil must remain high enough to maintain a vegetative cover. When need for fertilizer is indicated by the appearance of the vegetation, it should be applied in amounts sufficient to meet the deficiency but not in such excess as to cause unnecessarily heavy top growth. Grasses for roadside cover generally should be maintained at minimum nutrient levels so as not to cause undue mowing expense.

43. For general maintenance fertilizing, 30 to 50 lb. of nitrogen an acre, as required, has given satisfactory results.

### Mowing

44. Where mowing is necessary, a minimum mowing height between three and four inches results in a more dense cover of desirable grasses, less frequent mowing, and lower cost

of maintenance of equipment than does closer mowing.

45. Clippings should not be removed unless they are so heavy as to smother the existing vegetation.

46. Except where required for safety, snow drift control, or appearance considerations, slopes should not be mowed not only for economy but also because mowing prevents the development of indigenous woody plants.

### Herbicides

47. Significant economies can be effected in roadside maintenance by use of herbicides for control of brush where mowing equipment cannot be used, and for control of weeds where extra mowing would otherwise be required. Vegetation around guide rails and other structures can be economically controlled by use of herbicides.

### Soil Conditioners

48. The synthetic soil conditioners used in field tests did not prove satisfactory as substitutes for or supplements to hay or straw mulches for erosion control or as aids to establishment of a grass cover.

### New Equipment, Materials, and Methods

49. The cost of establishing and maintaining roadside vegetation can be materially reduced if advantage is taken of the modernized equipment, new materials, and improved methods dealt with in this study.

### Stabilized Turf Shoulders

50. Under the loads permitted on highways, stable turf shoulders can be constructed and maintained at lower cost than other types of shoulders provided traffic is only occasional.

## AGC Safety Awards Given

- Receiving AGC safety award: Harry G. Whitman, General Paving Construction Co., Grand Rapids, joint winner of third place award for 5-year experience in Highway Division; Dan A. MacInnis, Detroit Concrete Products Corp., Detroit, first place award for 1955, Group B, Highway Division; President Manley Osgood of the Michigan Road Builders' Association, holding first place award to AGC chapter with 100 members or more; John S. Pierson, Pierson Contracting Co., Saginaw, joint winner of third place award in Highway Division for 5-year experience. Awards were presented at the AGC annual meeting in New York, February 14, 1956.



# Highway Estimating Methods

By Geo. E. Deatherage

Construction Consultant, Lake Worth, Florida

Second in a series on estimating fundamentals, the first article on General Overhead having been published in April.

## II—Job Overhead Costs

**T**HIS, the second article in a series on Highway Estimating, continues to deal with indirect job costs or "Job Overhead" directly applicable to the work being estimated. It is separate and distinct from Main Office Overhead, which is the cost of doing business, irrespective of whether the firm has contracts.

And, as previously stated in the first article, the over-all Job Overhead is broken down into three main categories of general expense: (1) General Conditions, (2) Staff Overhead, and (3) Miscellaneous Equipment, Tools and Supplies. In the first article (April ROADS AND STREETS), a "reminder" or "check list" was presented listing 219 possible indirect job overhead items under the category of "General Conditions."

The present issue deals with the second category of job indirect or overhead expense, under the heading of "Staff Overhead." This latter item includes such labor and material charges having to do with supervision, shop men, watchmen and other classifications of labor — other than machine operators and helpers, who may be ordinarily figured in the hourly ownership/operating cost when estimating a unit labor price. In other words,

it is auxiliary or miscellaneous labor not engaged in actually producing on the site, and in that sense is overhead labor.

### Using "Check List"

In presenting a "Reminder" or "Check List" as a work sheet to check off applicable items or employees in this category, consideration must be given to the fact that the work under contract may be very large, and in addition to that, being performed abroad. For that reason, classifications are here included which normally would not be used by a contractor solely occupied on domestic work. Yet, the list would not be complete

without covering all the possibilities.

The mechanics of using the "work sheet reminder lists" is for the estimator to note the requirements as he goes through the contract documents and checking off the applicable ones thus (✓), and as they are entered on the estimate sheets to check them off thus (X) in the space provided. Non-applicable items are marked out thus (✓).

A careful checking and listing of these overhead items is an absolute necessity, for if they are overlooked the wages and salaries have to come out of the general overhead and profit, if any. Many firms make an

General Expense  
Reminder & Check List

Classification \_\_\_\_\_ Date \_\_\_\_\_  
Staff Overhead \_\_\_\_\_ State Project No. \_\_\_\_\_  
State Rd. No. \_\_\_\_\_ Project No. \_\_\_\_\_  
Other \_\_\_\_\_ Checker \_\_\_\_\_ Appvd. \_\_\_\_\_  
Estimator \_\_\_\_\_ Location \_\_\_\_\_ Sheet No. \_\_\_\_\_  
Cont. No. \_\_\_\_\_

| Cost Code | Classifications          | ✓ | X | — | Notes |
|-----------|--------------------------|---|---|---|-------|
| 2-10      | Project Manager          |   |   |   |       |
| 2-11      | General Superintendent   |   |   |   |       |
| 2-12      | Assistant Superintendent |   |   |   |       |
| 2-13      | Engineers                |   |   |   |       |
| 2-14      | Draftsman                |   |   |   |       |
| 2-15      | Blueprinter              |   |   |   |       |
| 2-16      | Safety Inspector         |   |   |   |       |
| 2-17      | Master Mechanic          |   |   |   |       |
| 2-18      | General Foreman          |   |   |   |       |
| 2-19      | Foreman                  |   |   |   |       |

● 1st sheet of suggested loose-leaf check list of Staff Overhead Items, many of which might be overlooked without such a reminder.

### Reminder List of "Staff Overhead" Cost Items

| Cost Code | Classifications          | Cost Code | Classifications              | Cost Code | Classifications                          |
|-----------|--------------------------|-----------|------------------------------|-----------|--|
| 2-10      | Project Manager          | 2-49      | Estimators                   | 2-78      | Gen. Foreman                             |
| 2-11      | General Superintendent   | 2-50      | Planning Chief               | 2-79      | Grade Boss                               |
| 2-12      | Assistant Superintendent | 2-51      | Cashiers                     | 2-80      | Shop Clerks                              |
| 2-13      | Engineers                | 2-52      | Invoice Clerks               | 2-81      | Cooks                                    |
| 2-14      | Draftsman                | 2-53      | Mail Clerk                   | 2-82      | Cookees                                  |
| 2-15      | Blueprinter              | 2-54      | Commissary Clerk             | 2-83      | Camp Flunkies                            |
| 2-16      | Safety Inspector         | 2-55      | Traffic Manager              | 2-84      | Bull Cook                                |
| 2-17      | Master Mechanic          | 2-56      | Freight Clerks               | 2-85      | Steel Foreman                            |
| 2-18      | General Foreman          | 2-57      | Industrial Relations Manager | 2-86      | Pile Driver Foreman                      |
| 2-19      | Foremen                  | 2-58      | Fire Chief                   | 2-87      | Carpenter Foreman                        |
| 2-20      | Shift Foreman            | 2-59      | Employment Clerks            | 2-88      | Mason Foreman                            |
| 2-21      | Paymaster                | 2-52      | Sanitation Inspector         | 2-89      | Labor Pushers                            |
| 2-22      | Bookkeeper               | 2-53      | Insurance Inspectors         | 2-90      | Finisher Foreman                         |
| 2-23      | Timekeepers              | 2-54      | Physicians                   | 2-91      | Mixer Foreman                            |
| 2-24      | Clerks                   | 2-55      | Nurses                       | 2-92      | Drill Shop Foreman and Crew              |
| 2-25      | Stenographers            | 2-56      | Ambulance Drivers            | 2-93      | Blacksmiths                              |
| 2-26      | Comptometer Operators    | 2-57      | Interpreters                 | 2-94      | Welding Shop Crews                       |
| 2-27      | Telephone Operators      | 2-58      | Airplane Pilots              | 2-95      | Tire Shop Crews                          |
| 2-28      | Expeditors               | 2-59      | Airplane Ground Crews        | 2-96      | Gas Engine Foreman                       |
| 2-29      | Purchasing Agent         | 2-60      | Rental Agents                | 2-97      | Tool Crib Foreman and Crew               |
| 2-30      | Yardmen                  | 2-61      | Canteen Crews                | 2-98      | Machinist Foreman and Crews              |
| 2-31      | Warehousemen             | 2-62      | Water Masters                | 2-99      | Sheet Metal Foreman                      |
| 2-32      | Telegraph Operator       | 2-63      | Labor Agents                 | 2-100     | Truck Repair Foreman                     |
| 2-33      | Radio Operator           | 2-63      | Special Investigators        | 2-101     | Equipment Repair Foreman                 |
| 2-34      | Messengers               | 2-64      | Parking Lot Crews            | 2-102     | Night Master Mechanic                    |
| 2-35      | Watchmen                 | 2-65      | Equip. Yard Boss             | 2-103     | Night Repair Crews                       |
| 2-36      | Waterboys                | 2-66      | Chauffeurs                   | 2-104     | Equip. Operators (If not in Unit Prices) |
| 2-37      | Storekeepers             | 2-67      | Service Station Operators    | 2-104     | Sewer Foremen                            |
| 2-38      | Toolman                  | 2-68      | Service Station Mechanics    | 2-105     | Aggregate Plant Crew                     |
| 2-39      | Material Checkers        | 2-69      | Electrical Repairmen         | 2-106     | Batch Plant Crews                        |
| 2-40      | Inspectors               | 2-70      | Elec. Shop Foreman and Crews | 2-107     | Cement/Concrete Lab. Crew                |
| 2-41      | Office Manager           | 2-71      | Service Truck Crews          | 2-108     | Road Maintenance Crews                   |
| 2-42      | Insurance Director       | 2-72      | Service Truck Drivers        | 2-109     | Service Warning Light Crews              |
| 2-43      | Camp Boss                | 2-73      | Field Office Clerks          | 2-109     | Right-of-Way Men                         |
| 2-44      | Housing Director         | 2-74      | Yardmaster and Assts.        | 2-110     | Dewatering Foreman                       |
| 2-45      | Janitors                 | 2-75      | Yard Train Crews             | 2-111     | Change House Crews                       |
| 2-46      | Guards                   | 2-76      | Repair Shop Crews            | 2-112     | Dump Attendants                          |
| 2-47      | Cost Accountants         | 2-77      | Subcontractor Liaison Engr.  | 2-113     | Other Misc. Employees                    |
| 2-48      | Payroll Clerks           |           |                              |           |  |

over-all lump sum estimate as a percentage of the cost of the work to cover "Staff Overhead" and unless some historical costs form the basis of it, the percentage figure is nothing more than a rough guess. Meticulous and accurate estimating does not find this latter practice acceptable.

In listing the items of "Staff Overhead" on the estimate sheets which carry labor, equipment and material columns, it must be understood that each of these staff overhead items posted may have, in addition to the wages and salaries, items of material, equipment expense, and miscellaneous expense connected with their employment. These must be calculated and posted also, item by item . . . in their respective columns.

In listing the wage or salary rates it must not be forgotten that the rates may need to be increased by fringe benefits, vacation pay and other incidentals. Travel and employment expense may also need to be considered if these have not been previously considered under "General Conditions."

On very large work the "Reminder List" should be supplemented by an organization chart which may develop other staff requirements.

### ASTM plans varied technical sessions

A variety of subjects relating to research and testing of engineering materials will be discussed at the 59th Annual Meeting of the American Society for Testing Materials, to be held at the Chalfonte-Haddon Hall, Atlantic City, N.J., June 17-22, 1956. A total of 31 sessions are scheduled beginning on Monday morning and continuing until Friday noon. Eight symposiums are scheduled on the following subjects: Specific Gravity of Bituminous Coated Aggregates, Ion-Exchange and Chromatography in Analytical Chemistry, Solder, pH Measurement, Tension Testing of Non-Metallic Materials, Steam Quality, Rheology, and In-Place Shear Testing of Foundation Soil by the Vane Method. In addition, sessions are scheduled at which individual papers will be given on the subjects of metals, concrete, fatigue, stainless steel, soils, and general testing.

The Society's 12th Exhibit of Testing and Scientific Apparatus and Laboratory Supplies will be an outstanding attraction. At this Exhibit, held every other year, the latest in research

and testing apparatus will be displayed by the country's leading manufacturers. Hundreds of items from small hand-manipulated instruments through electronic control devices and high temperature ovens to universal testing machines will be exhibited.

Important in the Society's activities are the large number of technical committee meetings which are scheduled. About 50 committees and their subcommittees will hold a total of about 500 meetings.

- The Pennsylvania Department of Highways Materials Laboratory Staff made more than 25,000 tests in connection with Highway construction and maintenance in 1955. Reviews included tests at the Central Laboratory at Harrisburg and tests on the projects in connection with 78 aggregate, asphalt or other plants located on projects and at the sources of certain other material manufacturers, such as cement, paint, etc.

- Washington state highway department recently has paced about 30 miles of four-lane highway using a diagonal joint design having 2 ft. of skew in 12 ft. of pavement width.

# THE BIG PUSH IS ON

By Kenneth F. Park

Consultant, Earthwork Engineering, San Leandro California

*An analysis of the "heart" of the scraper operation — including conclusions on some details of pusher work over which there continues to be confusion of opinion and practice among manufacturers and contractors.*

**P**USH loading scrapers is one of the present-day practices that has emerged from the past without fanfare, acclaim or even too much understanding of its whys and wherefores. The benefits are obvious, but its theory or best procedure generally are veiled in casual and noncomprehending use.

Actually the practice is potent — an insufficiently exploited money-maker. For instance on a 1000-foot haul a push-loaded, rubber-tired tractor-scraper combination is capable of producing 160 cubic yards more per hour than the same combination without pusher. Further, pusher potential on that haul is for helping three scrapers. Where else in excavation can so much be had for so little?

Without pusher help the high-speed

earthmover would have to be considered a "self-loader," and no such present-day machine is capable of the best economic practice under such necessity, except on special applications.

Rigid operational necessities are ever present, in such severe confliction that for the moment they seem to preclude the possibility of successful development of the self-loading principle.

True, there are many claims for good performance and they can be obtained, but generally at costs in excess of those developed around other better applications. This statement will be clarified a little further on.

In referring to pusher practice as

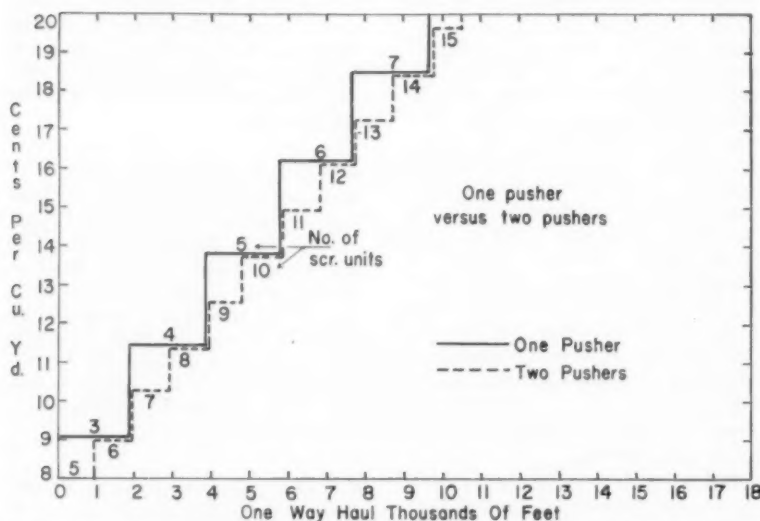
the "big" push the reference is literally true. Actually, there is no pusher too big for any scraper to which the method can be applied. The bigger the pusher in relation to the size of the load, the cheaper the cost of transportation, provided the pusher is kept busy. As larger loads are obtained in shorter periods of time, the scraper spends more time in transporting or travel — and any time spent by such machines in work other than travel increases the unit cost of their performance. It follows, then, that a reduction in loading time increases the time available for travel and lowers hauling costs. Again it follows that the most powerful pusher establishes that happy situation since it will load a scraper in less time with more material than a small-pusher.

## Pusher Loading History

The history of pusher loading help dates back but a few years. During the early development of the scraper itself — before the rubber-tired tractor appeared — there was some discussion in the trade of such loading help. This would have been during 1933. The first record we have of such an application — and no doubt it was the first — came in the spring of 1934 on a road contract near San Francisco, California.

Four-up, horse-powered pusher arrangements are known to have been used on early elevating graders — and "snatch" teams were in use on Fresno and slip scrapers for loading help way back in the beginning of their use. No record is made, however, of such help on scrapers until the time mentioned. Since scrapers themselves were in their own swaddling clothes at that time, it seems unlikely that previous uses of pusher loading were made.

Why the pusher anyway? Starting with track-tractor drawn scrapers,



● Chart for computing scraper production cost per cubic yard, based on average west-coast direct cost elements. For longer hauls, extend the stepped curve on upward.

pushing help gives quicker loads or larger loads — or both. Sometimes it merely makes easy in hard loading conditions a task that is too great for a single machine.

The true economics of pusher use lie in the attainment of larger loads — sometimes nearly twice as large as without the pusher. Obviously, twice as much earth moved in nearly the same elapsed time must result in greater profits.

As in most any earthmoving problem, the end results are definitely predictable, as with the usability of the completed structure of a bridge or a building. Certain factors contribute to certain performances. The control or creation of necessary factors produces preestimated results. So it is with tractors and tractor power.

An old rule of thumb established by the writer many years ago still remains singularly true: — “A pound of effective drawbar or rimpull produces a pound of earth in a scraper — in a minute — in 100 feet.” The lack of improvement or change in this basic principle lies in a close adherence to original bowl and structural designs.

There are but minor changes in any of the design features of today's scrapers, that would affect the basic premise. True, we have advanced in small, inappreciable ways, but it would be difficult to state the presence of any new irrefutable and important performance factors.

If such is true, then, the extra work-power of the pusher can be calculated as an addition to the power already in use. The added requisites of capacity, speeds and horsepower for the attainment of calculated outputs can be so established as to present better performances and cheaper costs.

Now, if we can, also, accept as a statement of fact that a pound of pull or push produces a pound of excavation, a calculation establishing a scraper performance must produce an answer in terms of pounds. Pounds must then be transposed into terms of excavation yards since that is the unit for the payment of most excavators' work.

Therein lies the crux of the errors in the thinking of many engineers and/or excavating men. Too often, estimates are based upon yardage alone, disregarding the fact that variations in unit weight has a definite effect upon performance and costs.

#### When is a Yard?

A cubic yard of excavated iron ore can weigh 4,000 lb. — a yard of excavated valley silt can weigh less than 2,000 lb. In a filled 20-yd. heaped ca-



● When is tandem pushing profitable? More often than many contractors realize. Guy F. Atkinson job at Cherry Valley Dam, California.

capacity scraper, iron ore would weigh 80,000 lb. — the silt less than 40,000. The scraper filled to overflowing with silt would be only half-full of iron ore with the same loading power — in the same time. A new tractor of today's vintage with 40,000 lb. of drawbar would help a wheel-tractor scraper combination load the silt to capacity in about 40 seconds. With difficulty, the same combination would require nearly 100 seconds to load iron ore to the same heap — this by reason of the weight involved and its relation to the pounds of pull or push exerted in loading it. Disregarding the overload to the machine's steel structure and its tires, the application is wrong and the proper calculation ahead of time would preclude the attempts to make the overload feasible.

#### Extreme Example Given

The example here given is an extreme one, selected to indicate the extent to which improper knowledge of loading power can throw all yardage performance calculations into error. It further should show the necessity for applying weight — and then pounds pull or push — to the calculation of performance and costs of moving earth. In addition it shows that the yard for which the contractor bid his price and for which he expects his yard-payment often turns out to cost the effort customarily expended in handling two yards — or some comparable ratio. Consequently he will have moved — depending on the length of haul — a third less material than he expected. His cost would be some 40% higher per cubic yard than he anticipated, and his profits negligible or non-existent. True, these fig-

ures are extreme, but neglecting to deal with excavating performance as entities of weight instead of volume, can readily result in these upsetting results.

This brings us back again to pushers and their place in the scheme of earthmoving. In order to fully utilize the pusher tractor for its greatest economy, it must be kept busy. In order to develop the cheapest hauling cost, the shortest possible loading time must be obtained. In order to obtain the shortest possible loading time, the biggest available tractor must be used.

Add to all this the need for efficient operation in all cases — with bonus operators if necessary — and the valuable position of the pusher is clearly seen. And incidentally, here is the job at which the best “skinners” in the contractor's outfit should be used.

Even as we speak of the pusher as the loading power of a scraper, it must not be overlooked that the scraper's tractor also supplies loading power, which should also be utilized to its best advantage short of tire slippage.

Actually the rubber-tired tractor of today's high-speed earthmoving package is primarily a hauling tool — fortunately a perfect spreading tool as well — and as such has inherent limitations in loading work. The use of pneumatic tires on wheels — so necessary for high-speed work — reduces their effectiveness on the slow and ponderous labor of loading. Pound for pound weight, a rubber-tired wheel has but 61% of the tractive effectiveness of crawler grousers in average earth footing. In order to de-

The following figures are based upon a 50 minute hour efficiency and an ownership and operating cost for the Tractor-Scrapers at \$17.65 an hour. The bulldozer pusher cost is taken at \$15.-20 an hour. The figures do not include any costs of overhead, supervision or profits. They are average machine costs based upon West-Coast investments and other cost and labor items. The maximum haul distances are those at which the Scraper units can work at 50 min.-hour efficiencies and

maintain the production rates of the pusher tractors — or 750 and 1500 cubic yard an hour, depending upon the use of one (or two) pushers respectively. Maximum travel speeds are taken at 33 mph.

Excavation or pay yards are assumed at 20 per load. All of these factors are workable, attainable and probable. The use of scraper sizes other than these — or less horsepower for loading — or slower maximum speeds — or faster — will change these relations.

| No. of Scrapers | ONE D9 PUSHING |                       | TWO D9s PUSHING |                       |
|-----------------|----------------|-----------------------|-----------------|-----------------------|
|                 | Haul (Feet)    | Cost per C.Y. (Cents) | Haul (Feet)     | Cost per C.Y. (Cents) |
| 3.....          | 1873           | 9.09                  | —               | —                     |
| 4.....          | 3802           | 11.44                 | —               | —                     |
| 5.....          | 5730           | 13.80                 | 901             | 8.01                  |
| 6.....          | 7658           | 16.15                 | 1873            | 9.09                  |
| 7.....          | 9586           | 18.50                 | 2838            | 10.27                 |
| 8.....          | 11514          | 20.80                 | 3802            | 11.44                 |
| 9.....          | 13443          | 23.21                 | 4766            | 12.62                 |
| 10.....         | 15371          | 25.56                 | 5730            | 13.80                 |
| 11.....         | 17299          | 27.91                 | 6694            | 14.98                 |
| 12.....         | 19227          | 30.27                 | 7658            | 16.15                 |
| 13.....         | 21156          | 32.62                 | 8622            | 17.33                 |
| 14.....         | 23084          | 34.97                 | 9586            | 18.50                 |
| 15.....         | 25012          | 37.33                 | 10550           | 19.68                 |

The horizontal and vertical steps can be plotted as constants on a templet and simplify plotting on the curve sheet.

velop the same amount of pulling power, rubber would require 64% more weight on the drivers than the tracks. The extra weight would require larger and costlier tires and 65% more horsepower to give similar performances to its present lighter form.

### Self-Loading Discussed

In the beginning of this article, reference was made to self-loading. Disparagement was indicated. General use of such specialized tools for this purpose is not recommended by the writer. Special applications are possible and such machines feasible, however, provided conditions are suitable and the calculation of factors to be met in the use indicate them. A job involving light clean-up work, small quantities and considerable travel is one of the applications considered proper. The occasions, however, are rare and the very elements of extra weight and horsepower requirements necessary to obtain good performance — coupled with the attending evils of greater investment costs and hourly ownership expenses — make most such applications unfeasible and economically unsound.

With such applications, oft-found

(Continued on page 115)

## Money Saving Coordination Southern Tire's GIANT TIRE RETREADING

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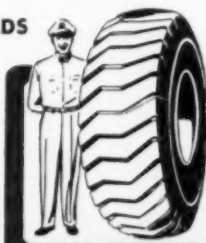
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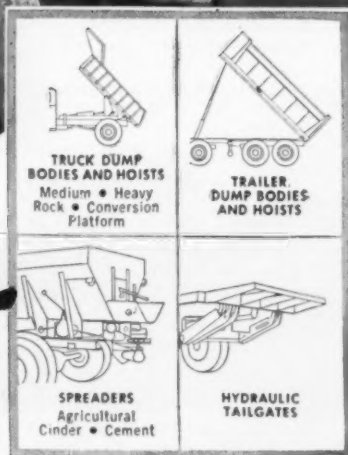
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. . . for more details circle 283, page 16

**ROADS AND STREETS, May, 1956**



# Compaction at its Best!



Southwest Model C-75 with DW-21 "Cat" on Dam Project in the West.



Southwest Model C-25 with D-6 "Cat" in Structural Backfill on Southern California Freeway Construction.



Southwest Model C-50 with "C" Tournapull on Large Housing Project.



Southwest Model C-15 with D-4 "Cat" on Highway Job.

## Structure Backfilling

Frequently neglected places are the restricted backfill areas around structures, such as abutments and similar spots. The smaller sizes, Models C-15 and C-25 of Southwest Heavy Duty Compaction Rollers, can work in close quarters and produce low-cost compaction.

On a recent State of California freeway contract a Southwest Model C-25, working on 10-inch sand lifts close to the concrete structure, developed 98.5 average modified AASHO densities in only four passes. The contractor was able to increase the yardage placed per shift by several hundred percent over slower hand and vibratory methods of compaction.

Kneading action of the backfill material by the Roller tires and the ponderous weight of the Roller produce maximum compaction results.

## Speed and Mobility

In earthmoving, the trend is to faster travel and unloading, particularly on large projects requiring the placing of big yardages per hour.

Equipment must of course be operated with a high degree of coordination—Southwest Heavy Duty Rollers teamed up with present day wheel type tractors can follow closely behind the earth-movers and maintain job efficiency.

For movement from job to job, where conditions permit, the Southwest Roller with its large tires, and ballast removed, can be quickly and readily moved over highways.

## Large Yardages

The present-day projects with big quantities of earthfill to place and compact must have large hourly production. Southwest Heavy Duty Rollers handle thicker lifts than Sheepfoot Rollers, and with fewer passes.

Lifts 12" to 18" are not uncommon with resulting yardage several times greater than obtainable with Sheepfoot Tampers or other slow-moving compaction equipment.

Fill conditions—soft spots, stones and boulders—are easily overcome without

interference to operations. The patented independent vertical oscillating weight boxes and constant, uniform wheel load pressures assure uniform compaction at all times.

The result is time savings and lower costs with larger yardages.

## Lower Maintenance Costs

The Pneumatic-Tired Roller will give lower maintenance costs per yard of production than other types of compaction equipment.

The few moving parts and long-life tires on Southwest Rollers keep maintenance costs at a minimum. Other items of equipment, particularly Sheepfoot Tampers with feet to be replaced, have greater unit costs due to numerous wearing parts.

## Interchangeable With All Tractors

Southwest Heavy Duty Compaction Rollers can be teamed up with all crawler type tractors and practically all wheel type, off-the-highway tractors.

For crawler tractors with standard drawbar, our standard goose-neck type draft beam is supplied.

For the wheel type tractor the properly engineered draft beam is available for this combination.

## Versatile Application

The range in sizes (15- to 100-ton) in Southwest Rollers will cover most all earthfill compaction jobs, from housing projects, highways and airfields up to the largest of earthfill dams.

Another feature, particularly valuable on levees and steep embankments, is the ability to operate without tipping over, as compared with the ordinary type Pneumatic-Tired Roller, should the outside wheel run off the edge of the fill.

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Construction Machinery Division

ALHAMBRA, CALIFORNIA

... for more details circle 253, page 16

**ROADS AND STREETS, May, 1956**

## The Big Push

(Continued from page 112)

contentment can veritably spring from the absence of preapplication calculations or sufficient comparative records, such as are here deemed necessary.

Variations in the application of pusher power present themselves and bear discussion.

First is the often-applied power of small tractors, or old and inefficient large tractors. Reiterated statements pointing out the utilization of pusher power and the economy of effective large power outputs show that the most powerful is the best. Anything less is a compromise. The degree to which power is short of being the best is reflected in longer loading periods — smaller loads — and consequently higher costs.

A good appearing practice — but questionable — is one in which a pusher as such is eliminated because several machines are working in and out of a borrow area and depend upon one another to help load out. It generally amounts to one hauling tool of the group perpetually being out of the string and doing a pushing job less effectively and at more cost than a pusher doing nothing else. The exception would be where a small number were working over very long hauls. Their return to the pit would be at such protracted periods that a half idle pusher would cost more than the extra yardage it would produce. Again a place for a calculation.

### Pushing-Ripping

An extra economy can often be obtained where too few scrapers are available and the tractor in the pit can be made to do part-time ripping as well, to spread its cost over the two activities. Sometimes two pushers can be placed in a borrow area — both equipped with rippers. Their work can alternate between ripping and pushing to make loading easier and quicker and get out more loads an hour.

A single pusher might conceivably rip up material otherwise impossible for scraper handling, and still serve as a pusher for a few scrapers. The group could in this way develop a cheaper cost per yard than that to be obtained by other methods.

This performance is striking. The economy of the operation has been questioned on occasion but generally has proved to be good. Large loads thus obtained so quickly look wonderful but the haul should be long. Two



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... for more details circle 209, page 16

### Quick Facts on Pusher Planing

- No pusher is too big for any scraper to which it can be applied.
- Bigger loads — nearly twice as big — therein lies the true economics of pushers vs. self loading.
- Know the weight of your material per cubic yard — and how it can sharply affect your hourly output.
- Self loading: it's usually not economical. Also questionable is one-scraper-pushing-another.
- Tandem pushers usually pay off — but consider substituting one very large tractor.
- How many pushers in your spread? A detailed analysis should relate pushers to scraper cycle time.
- "Chain loading" can often result in 40 loads per hour per pusher. Sometimes even more.
- If you are getting less than 30 loads per hour, something is wrong. Synchronization is one vital factor.
- Can you push-load for less than 1½ cents per yard? It can be done.

tractors serving a large group of scrapers on a long haul can thus produce very impressive loads and inexpensive loading costs — and the application is all right. Opposed to this practice and now deemed generally better — proved so in fact, on occasion — is that of replacing the two large tractors with one we will call a "giant" unit. The one giant machine will have less loading power than the two large ones, but still give a similar performance and cheaper loading costs. The answer lies very greatly in better synchronization between two machines than three. Here, too, lies an exception, however. If the scrapers have the capacity to take the combined loading ability of two pushers plus the pulling machine to give larger loads, the answer will be more in favor of the two pushers. Just a small saving in loading time alone is not sufficient — it needs, too, the advantage of the larger loads.

If two of the giant pushers were used in tandem and the scrapers were large enough to utilize all of their loading power, the practice of tandem pushing would increase performances again to make the method an excellent one. A calculation involving material weights and effective pounds pull would here again tell the owner what to do.

### How Many Pushers?

In a large operation where a considerable number of scrapers are available, or even down to the use of 3 or 4 or 5, two pushers in a pit are capable of setting up a very nice bit of

extra profit as opposed to the use of one. (See attending curve, page 110.)

Any pusher tractor should be considered as the loading tool, and scrapers should be fitted to its rate of production — just as you would relate trucks to a shovel. Any increase in pusher output reduces over-all hauling costs; that is why two pushers can produce greater pit efficiency than one.

### Loading Out Scrapers

An example is that of a D9 pusher loading out scrapers in .6 minute each — but which must maneuver from one scraper to another in the pit as they come in for loading. With such .6 minute loading periods and 1.0 minute total maneuvering time and other efficiency losses, the pusher cycle will average 1.6 minutes or 37.5 loads an hour. At 20 yards to the load, the hourly output would be 750 cu. yd. an hour. With each scraper in the spread, operating at all times to keep the pusher production constant, the allowable cycle time per scraper — load, haul, spread and return — is represented by the product of the time of the pusher cycle and any number of scrapers involved. For instance, each of three scrapers could take  $3 \times 1.6$  or 4.8 minutes as its cycle and keep the pusher production at its prescribed peak. Five could take  $5 \times 1.6$  or 8.0 minutes — and so on.

Now if two pushers were put in the same pit to send out 75 loads — 1500 cu. yd. — an hour, the average

time for scrapers to leave the pit would be one each .8 minute, instead of each 1.6 minutes as with one pusher. Three scrapers could only take cycle periods of 2.4 minutes each and five would be allowed 4.0 minute cycles each — and so on, to keep both pushers at maximum production.

At regular intervals, the cost of the yardage with the two-pusher spread would be substantially cheaper than that with one — then would be identical — then cheaper — and so on, in alternating frequencies.

The average throughout all hauls is in favor of two pushers.

By this two-pusher arrangement, what happens is that nearly all the unproductive time of one pusher is in effect eliminated. Even with identical pusher time elements and movement, scrapers should average to leave the pit each .8 minute with two pushers compared to one each 1.6 minutes with one pusher. Thus operating, a saving of .8 minute is created for each scraper and a better economy set up.

Knowing rates of travel and the periods of time involved in each factor in a scraper cycle, enables a contractor to estimate the distance out to which any number would operate and keep the pusher production up to expectations.

### Pusher Efficiencies

Pusher cycles have been variously timed, but any properly applied and well synchronized group of scrapers and pusher tractor should operate to allow loading out at least 30 scrapers an hour.

So called "chain loading" — an effect attained by eliminating backing up for each load in favor of a sideways switch has resulted in obtaining averages of 40 loads an hour. A level pit is to be desired and scraper operators must learn to come in so as to be alongside the load being pushed in as he arrives. The whole spread must then work the length of the pit in one direction and back — repeating the back and forth movement as long as the pit is in use.

Highly efficient and bonus-paid pusher operators have been known to get out as many as 50 loads an hour.

Synchronization is vital between pusher and scraper — just as it would be between shovel and truck. Once having established a rate of pusher production, however — such as 30 — 35 — 40 — 50 loads an hour, what might appear to be a poor fit — one to the other — often resolves itself into expected rates of progress, even

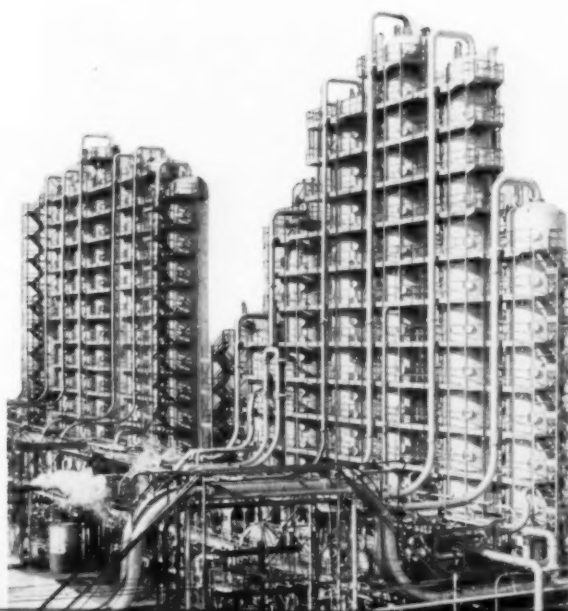
(Continued on page 133)

# End Stripping Problems

## Before They Start

### —Add **ACRA**\*

## At The Refinery



Eliminate costly and time-consuming paving problems with the new Asphalt Cement Refinery Additive —ACRA. An extraordinary heat stable anti-stripping agent, ACRA has been developed as a refinery or hot plant additive. It is a research product of the world's largest and oldest asphalt additive manufacturer.

While ACRA is a 100% active material, its ease of handling and low cost per pound are found only in diluted additives of much lower efficiency. ACRA is fluid and pumpable at ordinary temperatures — yet you pay for no solvents or diluents!

ACRA's superior and unique properties are readily demonstrated in the laboratory and field. Your local Nostrip Distributor will gladly render skilled technical assistance. For the full ACRA story, call upon us today.

# **NOSTRIP**

DIVISION

**MAGUIRE INDUSTRIES**  
INCORPORATED

182-27 Liberty Ave., Jamaica 33, N. Y.

PATENT PENDING

for more details circle 290, page 16

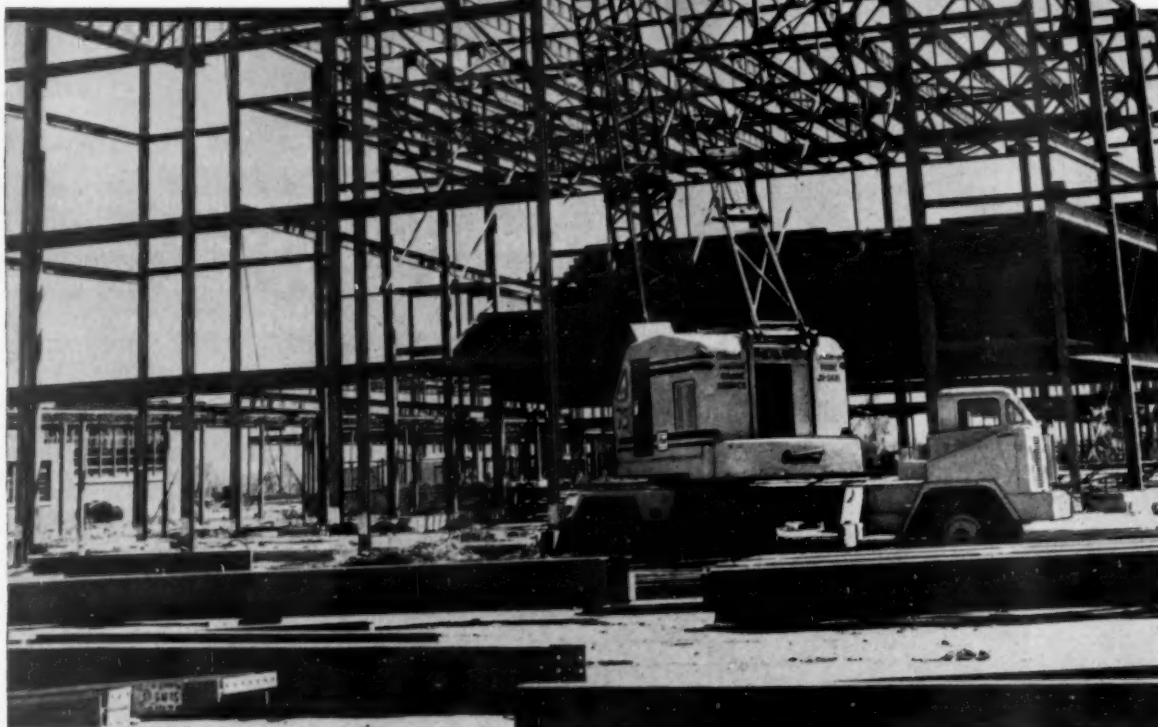


# gives you more PUTS MORE PROFIT



## **More for your money in excavators.**

Built and backed by specialists in  $\frac{3}{4}$  yard machines, Gar Wood excavators give you power steering for better maneuverability . . . independent travel while swinging for faster loading cycles . . . fluid coupling that absorbs digging shocks . . . independent chain crowd that puts more engine power into every bite. And, only Gar Wood gives you a complete selection of front-end attachments, including the exclusive Foundation Borer that digs up to 26 unreinforced footings per day!



**More for your money in truck cranes.** Gar Wood 75BTs give you the right combination of heavy-duty capacity and multi-job mobility for both construction and materials handling work. Live, 2-speed boom hoist with full power

for lifting and lowering . . . complete and accurate control at all times . . . optional hydraulic coupling for smoothest operation . . . complete, easy convertibility. All these advantages add up to safe, economical handling of 20-ton loads.

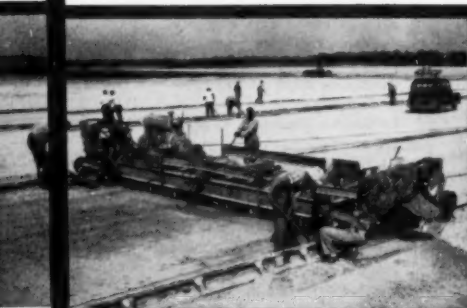
# for your money- INTO EVERY JOB!

Wood-Buckeye line is designed to stand up in rugged day-in day-out service . . . built to give you the production you need when you need it. Maintenance is easy. You'll find more anti-friction and sealed-for-life bearings . . . easier accessibility to components for periodic checks . . . unit construction for faster field servicing.

This adds up to more production per dollar invested . . . more profit from every job! Call your Gar Wood-Buckeye dealer and find out more about the way your equipment dollars work harder in this advanced line. Or, write to: Customer Service Department, Gar Wood Industries, Inc., Wayne 3, Michigan.



**More for your money in wheel-type ditchers.** Only Gar Wood-Buckeye gives you a live hydraulic wheel hoist for faster, more accurate positioning of digging wheel...hydraulic conveyor drive for instant adjustment to handle any volume of spoil...plus tractor-type crawlers, simplified group controls, tapered rooter bits. Such advantages as these explain why contractors make more profit on ditching contracts when they bid 'em with Buckeye!



**More for your money in finegraders.** Power Finegraders by Buckeye insure greater paving profits because they cut the grade faster and more accurately . . . protect you against penalties for thin slabs, save concrete dollars by eliminating slabs that are too thick. One man easily controls the Finegrader, produces up to 420 feet of a 24-foot grade per hour, and exactly to specifications. For extra profits, put a Finegrader on your next paving job.



**More for your money in spreaders.** Gar Wood-Buckeye surface material spreaders give you the speed you want, the accuracy you need to distribute sand, gravel, slag, salt and ashes at lowest cost. Hitching is fast, safe and automatic. Flow is accurately regulated for either uniform or tapered spread . . . from a mere sprinkle up to 2½-inch thickness. Width of spread adjustable in 6-inch steps. You get fast, positive spreading regardless of material, truck speed or direction.



**More for your money in ladder-type ditchers.** Only the Buckeye 407 ditcher offers push-button conveyor shift to speed work around obstructions . . . plus independent lever steering, speeds you can find and use, instant hydraulic boom control and many other features for easier operation, more production. The 407 is far easier to operate, control and adjust than any other ditcher in its class . . . big reasons why it's the world's largest selling ladder-type machine!

## GAR WOOD INDUSTRIES, INC.

Wayne, Michigan • Findlay, Ohio

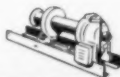
Plants in Wayne and Ypsilanti, Mich.; Findlay, Ohio; Mattoon, Ill.; Richmond, Calif.



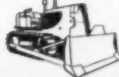
Gar Wood-St. Paul  
Hoists & Bodies



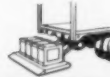
Gar Wood  
Load-Packers



Gar Wood  
Winches



Gar Wood  
Tractor Equipment



Gar Wood-St. Paul  
Frate-Gates



Gar Wood-Buckeye  
Hi-Way Wideners

... for more details circle 215, page 16

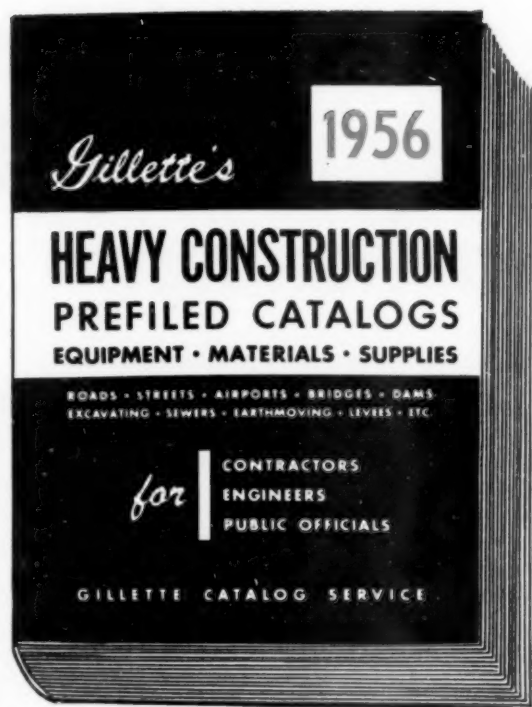
**ROADS AND STREETS, May, 1956**

here . . . without a doubt . . . is the most useful buying catalog in your office

. . . and here are some reasons why you should be **USING IT DAILY!**

- Catalogs are **PREFILED** — Saving you time and space required to file individual manufacturers' catalogs.
- Saves you the time and inconvenience of writing to manufacturers for catalogs.
- Gives you all the facts needed **BEFORE** you make a buying decision.
- Manufacturers' names and trade names indexed alphabetically for quick reference to individual catalogs.
- All the buying information is 'boiled down' — designed for your convenience.

After checking the advantages listed above, you can see why this **ONE CATALOG** offers you so **MANY** advantages . . . saving you both time and money, not only in the mechanical and physical aspects of a cataloging operation . . . **BUT MOST IMPORTANT OF ALL . . . it is available WHEN you NEED it . . . BEFORE you make your buying decisions!** The manufacturers represented in this catalog are literally 'meeting' with you in your office — offering you all the information you could possibly need concerning their products. Why not meet them at least half way — and **USE THEIR PREFILED INFORMATION!**

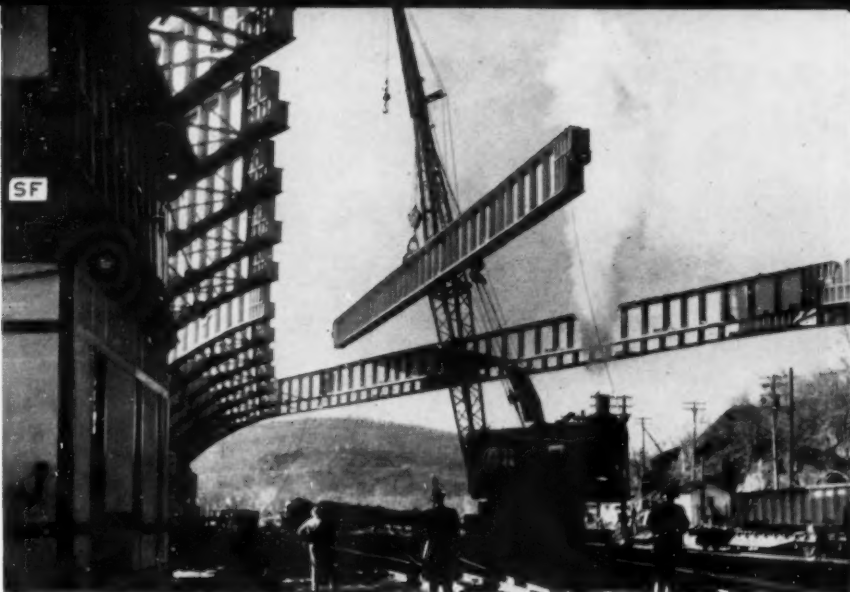


Here are the manufacturers represented in Gillette's Heavy Construction Prefiled Catalog:

American-Marietta Company  
 American Steel & Wire Div.  
 Anthony Company  
 Armco Drainage & Metal Products, Inc.  
 Arrow Manufacturing Company  
 Austin-Western Company  
 Baldwin-Lima-Hamilton Corporation  
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 Brisco Manufacturers of Calif.  
 Bros Boiler & Mfg. Co., Wm.  
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 Butler Bin Company  
 Carey Manufacturing Co., Philip  
 Chrysler Corporation, Industrial Engine Div.  
 Clark Equipment Company  
 Cleaver-Brooks Company  
 Cleveland Form Grader Co., The  
 Cleveland Trencher Co., The  
 Colorado Fuel & Iron Corp., The  
 Continental Motors Corporation  
 Cummer & Son Co., The F. D.  
 Cummins Engine Co., Inc.  
 Detroit Diesel Engine Div.  
 Electric Taper & Equipment Co.  
 Flexible Road Joint Co., The  
 Flintkote Co., The  
 Gar-Bro Manufacturing Co.  
 General Motors Corp.  
 Goodall Rubber Company  
 Harnischfeger Corporation  
 Heil Company, The  
 Heltzel Steel Form & Iron Co., The  
 Henry Manufacturing Co., Inc.

Hough Company, The F.G.  
 Huber-Warco Company, The  
 Ingersoll-Rand  
 International Harvester Co.  
 Jackson Vibrators, Inc.  
 Joy Manufacturing Company  
 Keystone Asphalt Products Company  
 La Crosse Trailer Corporation  
 Le Roi Company  
 Le Tourneau-Westinghouse Co.  
 Littleford Bros., Inc.  
 McKiernan-Terry Corporation  
 Mid-Western Industries, Inc.  
 Minneapolis-Moline Company  
 Naugatuck Chemical Div.  
 Owen Bucket Company, The  
 The Phoenix Products Company  
 Pioneer Engineering Works, Inc.  
 Prehy Company  
 Republic Steel Corporation  
 Rogers Brothers Corp.  
 Seaman-Andwall Corporation  
 Serviced Products Corp.  
 Shawnee Mfg. Co., Inc.  
 Stow Manufacturing Co.  
 Symonds Clamp & Manufacturing Co.  
 Timken Roller Bearing Co., The  
 The Toncan Culvert Manufacturers Association  
 United States Rubber Company  
 United States Steel Corp.  
 United Steel Fabricators, Inc.  
 Wellman Engineering Co., The  
 Westinghouse Air Brake Co.  
 Wick Wire, Spencer Steel Div.  
 Wico Electric Company  
 Williams Bucket Div.  
 Williams Form Engineering Corp.  
 Wisconsin Motor Corporation

Since 1942, the New York state department of public works has designed and constructed some 800 steel bridges for highways and turnpikes. With few exceptions these have been welded. This is in addition to many reinforced concrete bridges.



● Erecting 134-ft. suspended span members for all welded bridge carrying the New York State Thruway over the Erie Railroad near Suffern, New York. Contractor and fabricator, Klevens Corporation, Yonkers, N. Y.

## Welded Construction Now Standard for Steel Bridges in N.Y. State

UNDER the direction of E. W. Wendell until 1954, and since then under C. F. Blanchard, successive deputy chief engineers, the department has been a pioneer in this country in welded bridge construction. For reasons of economy, increased public safety and pleasing appearance, the department has adopted welding as the standard for deck type highway bridges. Practically all of the 500 bridges on the New York State Thruway were welded, as designed and constructed under the supervision of Wendell and Blanchard. The New York department also completed its first all-welded steel railroad bridge.

E. J. Ramer and S. Miller, both principal civil engineers for the department, have been directly responsible for the welded bridge designs. Although these men have used welded design for 20 years on various public works projects, most of the welded bridges have been built since 1946.

The impetus to welded design, notes a Lincoln Electric spokesman, developed with the change from through-type to deck-type bridges. This latter type, incorporating composite construction, supplied safety along with functional appearance and economy through welded design. Using the full section of steel members

provides for efficient and economical use of material, since no reductions are necessary as with riveted structures.

In many cases, especially where continuous design is used, the over-all depth of the bridge deck can be reduced significantly. This not only provides for necessary headroom under the bridge, but effects appreciable saving. The savings on welded steel bridges designed by the New York department of public works have proven to average from 15% to 20% both in steel and in cost over similar steel riveted structures. Of equal importance are the savings in the found-

● Thruway over Onondaga Lake Outlet in Onondaga County; 100% welded deck cantilever plate girder bridge, built in 1953. Three main spans — two at 125 ft. and one at 200 ft. Fabricated by American Bridge Company.





● Delaware and Hudson R.R. over Cherry Valley Turnpike in Otsego County; 100% welded through plate girder bridge, built in 1954. Two 80-ft. spans. Fabricated by Phoenix Bridge Company.

dations and fills. Saving one foot in depth at the bottom of the usual fill, when extended on the bridge approaches which constitutes miles of highway, can amount to major proportions in saving in money.

Arc welding is used for shear connectors, shoes, additional cover plates to rolled sections, 100% welded girder fabrication, bracing stiffeners, splices, etc.

#### Present Day Welding

At present, according to Mr. Ramer, all welding is performed by qualified welding operators employed by the contractors, utilizing mild steel arc welding electrodes with covering of low hydrogen type. The Department qualifies all field welding operators by having them prepare test specimens under the supervision of our construction engineers, in accordance with special specifications based on American Welding Society Specifications for welded bridges. Complete data also are listed as to the equipment, voltage used, and all other pertinent information, which is forwarded to the department laboratory together with test specimens. These specimens are tested to destruction and the results forwarded to the office of the deputy chief engineer for review. The construction engineer in charge is then informed by us as to whether or not the welding operator is permitted to proceed with the actual welding required. A complete list of qualified welders is maintained in our office with the dates that the operator passed his tests covering fillet and groove welds in various positions. Determinations, based on this list, are made as to any future qualification tests. This system, of course, obviates the need for unnecessary retesting and is of much aid to the contractors in organizing his welding operations.

The department has established

standards for all structural welding using electrodes with coverings low in hydrogen. Many tests and investigations by various interested groups (including Bureau of Public Roads) have definitely indicated that electrodes with coverings low in hydrogen, deposit weld metal far superior to that deposited by the conventional electrodes.

The as-welded mechanical and impact properties of weld metal formed from electrodes with low hydrogen covering approach the properties of stress-relieved weld metal deposited by the usual electrodes.

John W. Johnson is superintendent of public works and Eugene F. Gibbons chief engineer of the New York State Department of Public Works.

#### Notes on Welding Requirements, as Furnished to Contractors in New York State

Steel base metal shall conform to the requirements of the current edition of the Specification for Structural Steel for Welding (A.S.T.M. — Serial designation A373).

Mild steel arc-welding electrodes with covering of low-hydrogen type shall be used for all welding. These electrodes must comply with ASTM-A233-48T requirements for Classification E6015 or E6016. Care shall be exercised to prevent the absorption of moisture by the low-hydrogen coatings. Electrodes which have been removed from their moisture proof containers for more than 4 hours shall be restored by drying for 2 hours or more at a temperature of 300° F. in an approved furnace.

The procedure of electric arc-welding to be followed in construction shall be submitted to the Deputy Chief Engineer (Bridges) for his approval before any fabrication, assembly or welding is started.

Flange plates of girders are to be completely welded separately before assembly with web plate. Web plates shall also be spliced and completely welded with complete penetration groove welds in advance of assembly.

In order to avoid locked up stresses when welding flange plates to web plates, welding shall begin at the center of the girder and proceed outward to the ends, leaving the ends free to move as the welds contract.

When welding the comparatively thin web plate to a thick flange plate, special precaution must be exercised in the positioning of the electrodes so that the major portion of the welding heat is applied to the thicker plate.

The above notes are predicated on the basis that all girders will be completely shop welded and this is desired. If, in the opinion of the Deputy Chief Engineer (Bridges) it is found impracticable to utilize girders in one length, consideration will be given to the use of a single welded field splice for each girder, the details of which must meet with the approval of the Deputy Chief Engineer (Bridges).

All welding shall comply with the provisions of the current Specifications for Welded Highway and Railway Bridges of the American Welding Society except as noted above. Particular attention is directed to the requirement that the ends of all butt welds in girder flanges shall be made with extension bars as described in Article 606e of the 1947 A. W. S. Specifications for Welded Highway and Railway Bridges.

Completed girders shall be true to line and shape, free from any distortion, warpage or other shrinkage stresses.

## Court Decisions

### Workmen's Compensation

The Arkansas Supreme Court, on December 6, 1954, handed down a decision (*Baldwin Co. v. Maner*) ruling that a subcontractor's employee injured on a construction project can recover damages from the prime contractor whose negligence caused the injury. The subcontractor had secured payment of Workmen's Compensation benefits to his employee. The Arkansas Act makes the prime contractor liable for compensation claims for employees of his subcontractors in event the subcontractor fails to cover them.

Being covered by the subcontractor the Court rules that the prime contractor becomes a "third party" and subject to common law action in tort for injuries. *Virginia Road Builders' Association Bulletin*.

### A barrier of feathers

An excavation in a Pittsburgh, Pennsylvania, street for a water pipe was four feet wide, fifteen feet long and from one to four feet deep. A single wooden horse placed at one end of this ditch and flares extinguished later by a rain were the only warnings.

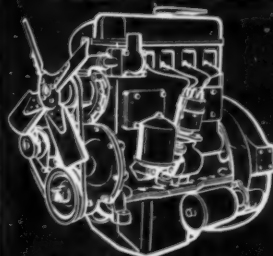
Early that evening a motorist hit this wooden horse and threw it aside. Two hours later another car dived into the ditch and one of the occupants was seriously injured.

In its affirmance of this judgment the appellate court said, "A barricade to be effective must be constructed of such material that it will by size, weight and conspicuousness offer visual and reasonable resistance to the elements and to fortuitous invasion. A contractor who erects a barrier of feathers around a dangerous crater cannot defend so ephemeral a protection on the ground that he had no reason to expect a high wind.

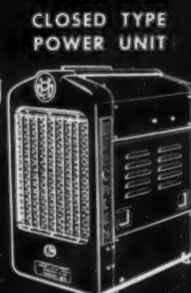
"One who creates a dangerous situation on a highway and then ostensibly plants flares against nocturnal mishap, does not absolve himself from responsibility unless he exercises some reasonable foresight as to weather possibilities and mechanical defects as well. It is futile to speak of warning flares which lack illumination. It is common knowledge also that an intense rain, especially in combination with the obscurity of night, will carpet the surface of the ground with shadows that conceal irregularities, depressions and cavities."

*Walsh v. City of Pittsburgh, 108 Atl. 2d 769, Pennsylvania, Nov. 8, 1954.*

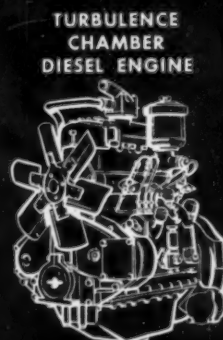
## HERCULES ENGINES...



OVERHEAD VALVE  
GASOLINE ENGINE



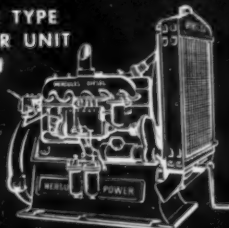
CLOSED TYPE  
POWER UNIT



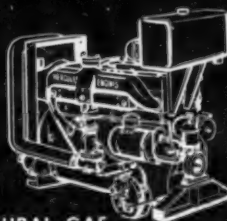
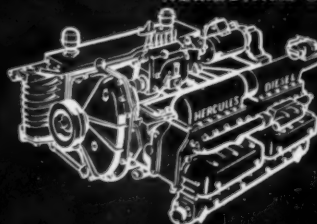
TURBULENCE  
CHAMBER  
DIESEL ENGINE

The complete line of engines  
and power units from 3 to 500 H. P.

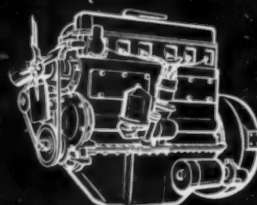
BASE TYPE  
POWER UNIT



"PANCAKE" or  
HORIZONTAL ENGINE



NATURAL GAS  
L-HEAD ENGINE



DIRECT INJECTION  
DIESEL ENGINE

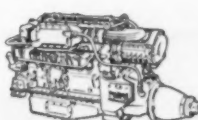
The wide selection of engine types and sizes in the Hercules line, plus the flexibility of our production facilities provide a complete line of dependable power to meet the varied needs of many different industries.

In addition to the various types of engines and power units illustrated,

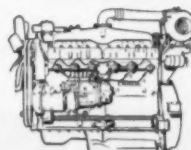
it is the policy of Hercules Motors Corporation to engineer and produce these engines to the specific requirements of each industry.

For assistance in solving your particular power problems, contact Hercules Motors Corporation—Engine Manufacturing Specialists since 1915.

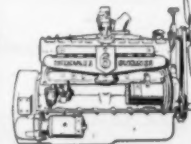
MARINE DIESEL



TURBO-CHARGED DIESEL



L-HEAD GASOLINE



**HERCULES MOTORS CORPORATION**  
CANTON 2, OHIO

... for more details circle 220, page 16

# Pound for pound, the powerful truck V8's are

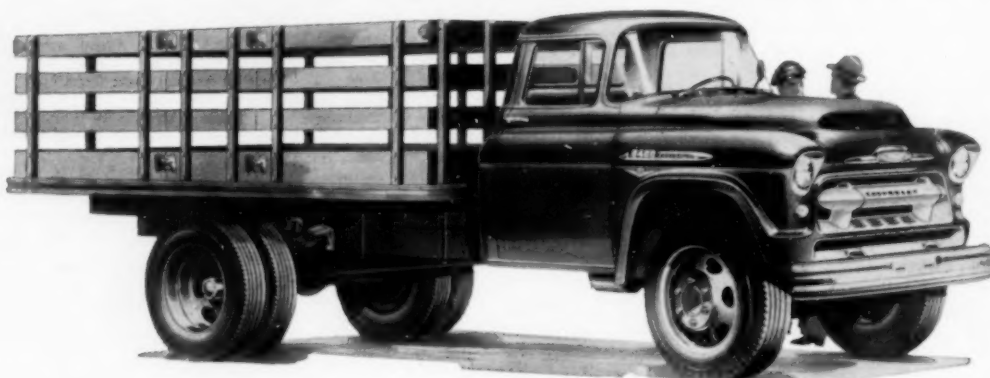
They put out more horsepower per pound than any other V8 in any truck. Here's modern, *efficient* engine design with less dead weight, more pound-pulling power for you!

The new V8's in Chevrolet light-, medium- and heavy-duty trucks are the *most modern* on the market—and the pounds prove it! These great engines weigh up to 200 pounds less than competitive V8's, yet are fully comparable in power output. The *dead weight* you'll find in other V8's has been eliminated—to give you the leanest-muscled, best perform-

ing powerplants the trucking industry has ever known!

One basic reason for this compact efficiency is *short-stroke design*—the shortest stroke of all leading truck V8's. Shorter stroke means less piston travel, less engine wear, maximum pulling power from less fuel. But, when combined with Chevrolet precision engineering, it means *even*

*more*. It makes possible, for example, a more compact cylinder block . . . shorter, more durable connecting rods . . . a crankshaft that is light yet extremely rugged. Here, every component part reflects hair-splitting efficiency that wastes nothing. *To you, it means a new kind of low-cost hauling, longer engine life, weight-saving power to pull beefed-up loads!*



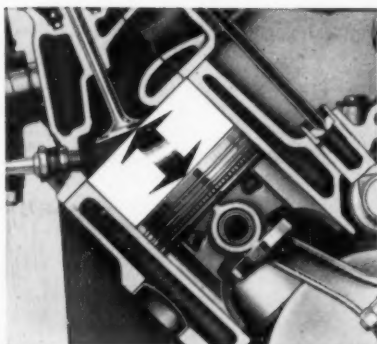
NEW HEAVYWEIGHT CHAMPS!



## NEW CHEVROLET

Anything less is an

# most Chevrolets



Shorter stroke, indicated by the arrow above, is your assurance of power that eats up work while using less fuel, and minimum engine wear stemming from reduced piston travel.

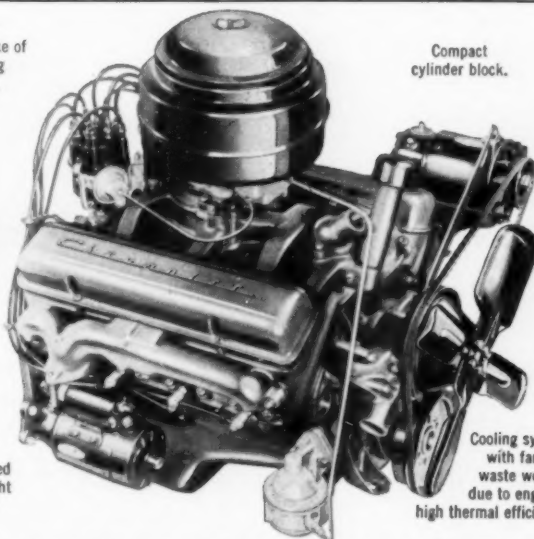
**All-new Loadmaster V8** powers Chevrolet heavy-duty models! Typi-

Shortest stroke of any leading truck V8.

Compact cylinder block.

Shorter, more durable connecting rods.

Extremely rugged—yet lightweight crankshaft.



Cooling system with far less waste weight, due to engine's high thermal efficiency.

Modern features such as these help pare off dead weight... assure maximum *working power* to pull your big loads more efficiently and economically. Shown above is the Taskmaster V8, standard on Series 5000, 7000 and 8000—optional on Series 4000 and 6000

cal of these great V8's is the new 322-cubic-inch Loadmaster—standard on Series 9000 and 10000. This brawny engine provides 195 hp and 310 ft.-lbs. of torque to ease your toughest pulls. High 7.7 to 1 compression ratio aids fuel economy. Advanced features such as hydraulic valve lifters, chrome-plated top ring and full-flow oil filter add to engine

life, cut maintenance expense. And, like all Chevy V8's, the Loadmaster engine is leader in its class for compact, efficient short-stroke design!

Yes, whatever size truck your job calls for, Chevrolet now has a *modern* short-stroke V8 to serve you better, save you money! See your Chevrolet dealer *soon*. . . Chevrolet Division of General Motors, Detroit 2, Mich.



**NEW MIDDLEWEIGHT CHAMPS!**

## TASK·FORCE TRUCKS

*old-fashioned truck!*

... for more details circle 217, page 16

**ROADS AND STREETS, May, 1956**

**125**



● New Highway fill includes additional fill for new location of residence moved from present roadbed.

## Embankment Widening Solves Right-of-Way Problem

**W**HERE would you put a house that's in the way of a suburban highway re-location? This familiar problem was solved in a rather neat and unusual way recently by the state highway department division staff of Troy, Alabama.

Specifically, the problem was to widen and straighten U. S. 231, an old 1919 model 18-ft. concrete road through the small community of Orion. As is usual with such roads, this one was flanked by houses and stores. The building lots are long and narrow, as highway frontage went for a premium, and at the rear disappear into deep ravines. In order to modernize the two-mile section through Orion it became necessary to relocate short segments to relieve sharp curves. This brought up the moving of certain structures back off the new right-of-way.

### Alternatives Investigated

All went well until the last house on the north end of Orion was reached. At this point the new location of the highway dictated the moving of a Class "A" residence some 50 to 60 ft. out into one of the deep ravines. As this course of action was violently objected to, several alternatives were investigated and discarded as impractical or too costly. These alternatives included the moving of the house across the new road to abandoned right-of-way; purchase of another lot one-half mile away and moving house there; construction of a new house at one of several locations; or driving long piling for a new foundation at the desired location.

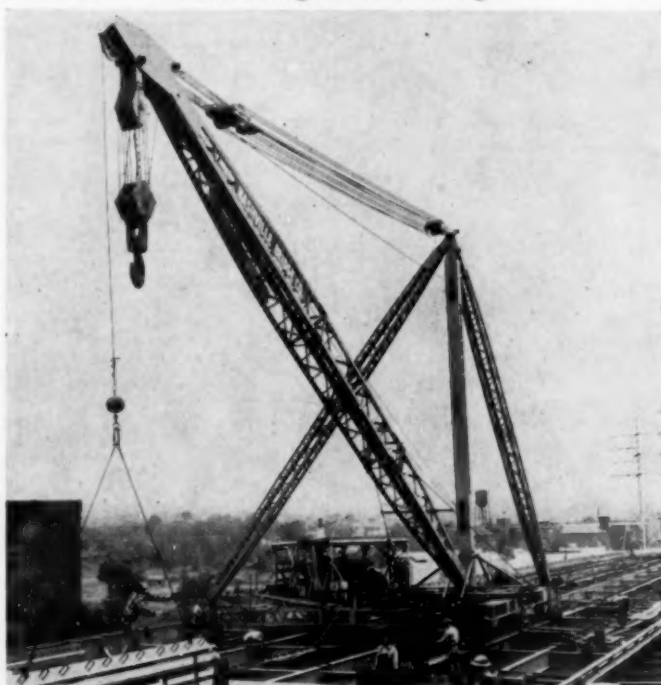
The solution, as here pictured, was to include in the roadway fill a widened integral fill section, designed to accommodate house and yard farther back on the original lot. This fill, built to standard density specifications

reaches 20-ft. depth in the rear, and contains nearly 11,000 cu. yd. of earth.

Moving of the structure was performed by a local subcontractor, and the whole problem was thus settled to the satisfaction of all concerned, and incidentally, at minimum cost to the state.

Joe F. Walters Construction Co., Troy, Alabama, was the prime contractor and sublet the removal of structures to R. E. Shaw of Clio, Alabama.

### Steel Being Set for Bridge



● Steel being set for bridge over Cumberland River at Nashville, Tenn. Used here is an American three-drum hoist powered by a General Motors 4-71 Diesel engine with GM torque converter. The hoist operates an American 54-ton steel stiff-leg derrick with 80-ft. boom and 46-ft. supporting mast. Nashville Bridge Company of Nashville, contractors.



# Stop unnecessary maintenance

## *Stabilize shoulders with Morton Salt*

- Cut aggregate loss • Check erosion and rutting
- Save on grass and weed removal

You get tough shoulders that resist frost boiling and heavy storms . . . shoulders that last far longer under the pounding of heavy traffic . . . when you stabilize with Morton Salt. Stabilizing with Morton Salt not only saves man-hours and maintenance money, it also reduces dust and eliminates accidents caused by soft shoulders.

What's more, stabilizing the base course of primary roads with Morton Salt helps prevent the 9 out of 10 road failures which result from faulty foundations. It's also a fact that gravel roads stabilized with Morton Salt give more service per dollar than roads built by any other method. (Savings in aggregate alone more than pay for the salt.) You get smooth, durable, water-repellent surfaces that require minimum maintenance.

. . . for more details circle 236, page 16

**ROADS AND STREETS, May, 1956**



*Please send me your free booklet on salt stabilized roads.*

Name \_\_\_\_\_  
(please print)  
Title \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ County \_\_\_\_\_ State \_\_\_\_\_

**MORTON SALT  
COMPANY**  
INDUSTRIAL DIVISION

Dept. RS-5, 120 So. La Salle Street,  
Chicago 3, Illinois



# Variable Thickness Soil-Cement



● Caterpillar No. 12's excavating and leveling subgrade, preparatory to constructing a 12-ft. soil-cement lane on either side of existing U. S. 70.



● Spreading bulk cement with a T. L. Smith cement spreader.



● Making an 8-ft. pass for lower 6-in. lift of soil-cement, with a P&H stabilizer.

A widening project was completed in Texas recently which is noteworthy for several reasons. One is that the job, entailing 42 miles of 12-ft. soil-cement widening lane, is the largest soil-cement yardage ever handled in a single contract by the Texas highway department. Strain Bros., of San Angelo, the contractor, took the job at \$640,000 which covered grading for the widening, the soil-cement, full-width resurfacing, 30 culverts and a bridge. The project covering a 21-mile section of U.S. 70 in Foard County in northwest Texas, was executed between May of 1955 and January, 1956.

Another point of interest was the construction of soil-cement in two different thicknesses within the 12-ft. lanes, which lanes were added on either side of an existing 2-lane concrete pavement built in 1928. The inner 8 ft. width of the lane was constructed to 12-in. thickness in two 6-in. lifts. The outer 4 ft. was built 6-in. thick.

## Big Daily Yardage

A third item of note on the project was the rapid progress achieved by the contractor in constructing the soil-cement lanes. The 25-man crew on this part of the work placed as high as 11,000 sq. yd. or more per day, or more than 10,000 lin. ft. lane at peak of operations. The 290,000 sq. yd. of stabilization was cleaned up in jig time.

Soil-cement equipment included a Caterpillar No. 12 motor grader, T. L. Smith cement spreader, P & H single-pass stabilizer, sheepfoot roller unit with Caterpillar D6 tractor, another Cat tractor, Farmall wheel tractor towing a Grace rubber-tired roller, and a 2,000-gal. sprinkler truck. Standardized methods were used, taking the usual care to keep the moisture near optimum during mixing, trimming and rolling. Daily test samples were run in a field laboratory to check against the moisture-density

# Used in Texas Road Widening Job

curve established at the start of the job. The lab, located at a nearby town, was operated jointly by the contractor and the highway department.

## Completing Soil-Cement

Following completion of the soil-cement, it was immediately given a sealing cover of RC-2 asphalt, applied with an Etnyre distributor. Following the prescribed 7-day curing period, the surface was ready for the asphalt topping. Hot mix was applied in two courses totaling 2½-in. thickness over the old pavement and new lanes, using a Barber-Greene finisher, Ingram 3-wheel roller and Ingram tandem roller. Final step was a dusting coat of white limestone chips. Asphalt was supplied from a Standard plant with 5,000 lb. pugmill, using gravel aggregates produced by a Diamond portable plant.

H. T. Cunningham, senior resident engineer, supervised the project for the Texas highway department. L. B. Baty of Strain Bros. was job superintendent; H. W. Smith was asphalt superintendent. According to J. H. Strain, the job was carried on by an average over-all working force of 50 men and was completed without interruption of traffic.



● Compaction in progress over entire 12-ft. of soil-cement width.



● Final rolling of lower soil-cement lift, with Grace rubber-tired unit drawn by an International Farmall.

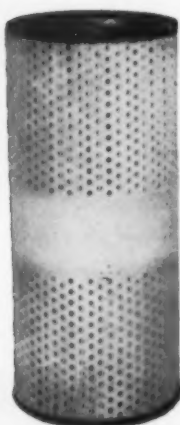
- Applying RC-2 curing cover for lower lift. Similar application also made for top lift, prior to placing hot mix resurface over entire widened highway. (At Right): Superintendent L. B. Baty looking over plans with resident engineer H. T. Cunningham and J. H. Strain of contracting firm.





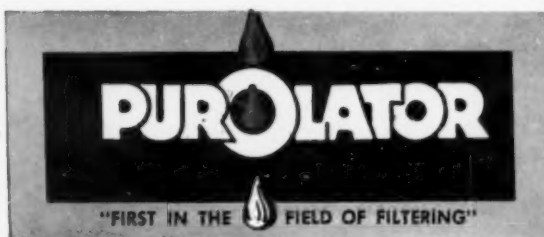
103 drawbar horsepower is feature of new International TD-18A Diesel crawler.

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PUROLATOR PRODUCTS, INC., Rahway, New Jersey, and Toronto, Ontario, Canada

. . . for more details circle 242, page 16

**ROADS AND STREETS, May, 1956**

## Traffic Safety

### More trucking accidents as mileage mounts

Accidents on the highways involving trucks increased 11 per cent during the first seven months of 1955 compared to the comparable 1954 period, according to figures from the Interstate Commerce Commission. Accidents involving buses or trucks increased 27 per cent, injury accidents were up 8 per cent, and property damage accidents rose 12 per cent. The fatalities for the 1955 period totaled 882. Property damage involved in such accidents totaled over \$18 million for the period.

The report notes that these figures are what might be expected in view of the sharp gain in truck carrier mileage. For the nation as a whole, mileage of carriers with firms doing over \$1,000,000 annual business rose 12.6 per cent. The mileage increase however was not uniform inter-regionally. There was virtually no increase in the Rocky Mountain and Pacific regions, where a prolonged trucking industry strike occurred. Central Region mileage jumped 19 per cent, on the other hand.

### Television helps unscramble piled-up urban traffic

Unscrambling traffic pile-ups at various lanes or stations of a toll highway, tunnel or bridge can now be accomplished from a central headquarters with the flick of a dial and no need for helicopters or scouting teams.

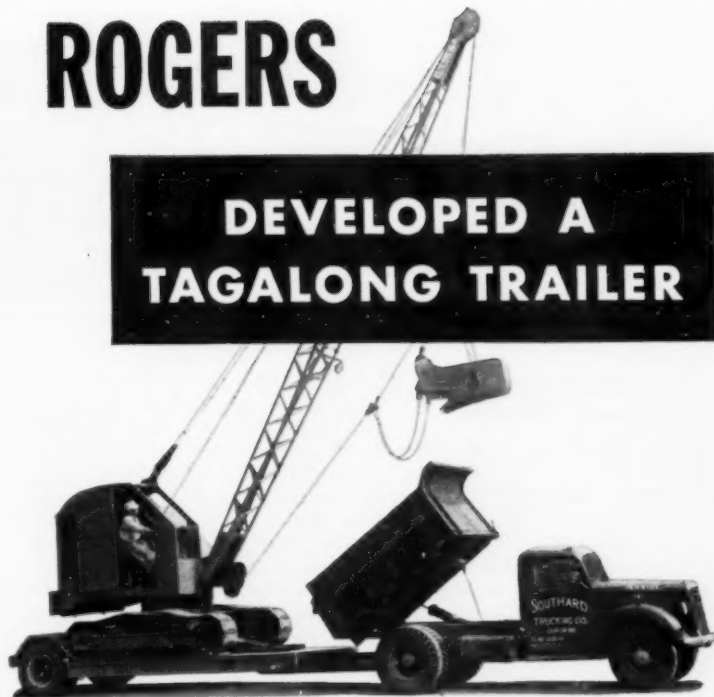
So claims Taller & Cooper, whose engineers have developed a closed-circuit television system for such use.

Demonstrated for the first time publicly at the recent annual convention of the American Bridge Tunnel and Turnpike Association in Atlantic City, the self-contained TV system aids in the automatic supervision of traffic movement from a single center. The wired television cameras may be placed in any number of remote, inaccessible or hazardous locations and one or all of the cameras can be controlled by changing the switches on the monitor dial at the viewing point.

Cameras situated at different points may send their picture signals to a single receiver, or to several receivers, also located at different points. Or a single camera may be set up to send its picture to an unlimited number of receivers in separate supervisory or executive offices.

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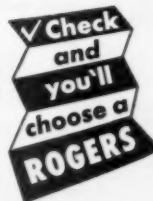
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... for more details circle 246, page 16



● New 95 x 218 Foot Garage Completed by The Kansas highway commission at Garden City

### New shop building for Kansas highway division

An example of modern shop and garage layout and design is the new building recently completed for the Kansas highway division at Garden City.

Pictured here, this \$200,000 structure will be the hub for highway activity in 19 counties, and serve as headquarters for major vehicle repairs, as a supply center for district shops for surrounding cities, and for equipment storage.

The building has a steel frame and brick walls, window space taking in practically the entire north wall. The shop will have six stalls for repair work, each with an individual outside overhead door, representing a rather new idea in shop construction in the opinion of division engineer J. B. Stevenson.

Emphasis has been placed on giving each mechanic ample room in which to operate efficiently.

Each of the five districts in the Garden City division has a shop with one mechanic and usually one helper

to take care of the smaller mechanical jobs.

The new division shop will take care of motor overhauling and other major work, through six mechanics, one welder, a shop foreman, and a service man.

The new shop includes space for the commission's radio telephone dispatcher and engineer, with a shop set up for the engineer.

All maintenance equipment painting is done in this shop, superintendent of which is J. F. Hofbauer.

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## The Big Push

(Continued from page 116)

while there are gaps — or waiting periods when scrapers "gang up." The answer lies, of course, in keeping up the estimated average number of loads to be pushed out each hour.

Using 30 loads an hour as an example, the average pusher cycle time is 2.0 minutes. A pusher tractor and wheel-type tractor scraper combination with a combined loading power of 60,000 lb. would load 20 bank yards of 3,000 lb. earth in 1.0 minute. The other minute of the two is spent in transfer time and other unaccounted-for inefficiencies. Thirty loads an hour of 20 cu. yd. each means that 600 yards an hour will be handled. For each scraper in the group an allowable cycle time is calculated by multiplying the time of the pusher cycle by any number of scrapers involved. For instance, with three scrapers — each could take 6.0 minutes for its cycle and keep the pusher busy. For five scrapers 10.0 minutes.

This points to the fact that the haul distance of each scraper could increase if 5 were in use instead of 3.

If pusher efficiencies are increased by some of the means mentioned and 40 loads an hour are obtained, the average pusher cycle becomes 1.5 minutes. Since the loading power is assumed to be the same as that in the preceding example, it means that the transfer time and efficiency losses have been reduced to 0.5 minute — 800 cu. yd. is now the pusher loading rate and three scrapers would each have to operate to a 4.5 minute cycle to keep the pusher busy, and five to a 7.5 minute cycle.

To carry these figures further, suppose the D9 pusher used in the preparation of the curve — taking but 0.6 minute to load out the same 20 bank yards — could reduce its transfer and efficiency losses to 0.5 minute, then the cycle time would be 1.1 minutes and the output 54½ loads or 1090 cu. yd. an hour. Three scrapers could take cycles of 3.3 minutes each and five scrapers 5.5 minute cycles. This tremendous loading rate would require more scrapers on any given haul than the 30-load or 40-load rate.

Today's best pusher help would slide as much as 2400 cu. yd. an hour over scraper blades if there were not inefficiencies — and lost time between one load and another. As it is, a well adapted and operated pusher-scraper group can turn out as much as 1000 cu. yd. an hour — 800 should be a certain figure in good going. This

amazing rate of performance is obtained at a very low unit cost and represents today's cheapest methods.

Here is a place where PUSH is better than PULL. And since PUSH is a necessary requisite to progress and success, and good scraper operation — let it be the best.

The biggest tractor applying "bonus output rates" by the pound will pay off by the yard.

These extras necessarily cost — and set up proportionately higher investments and operating expenses. Such

increases are justified however, where performance demands warrant them. Under certain conditions wheel machines are capable of performance impossible to tracks — such as similar work demands in widely separated areas where one highly mobile unit might conceivably replace several track-type machines. It must be admitted in fairness to each, however, that there are spots where one or the other would work admirably and its competitor would fall far short of requirements.



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# DIGEST of Current Engineering Literature

By JOHN C. BLACK, Associate Editor

## Culvert relining — a review of factors

Valuable structures weakened by age or erosion, or subjected to increased loadings, frequently can be salvaged by relining.

The author discusses generalities of the problems involved. "The selection of the shape of the lining and the type of material to use depends on how much the existing opening can be reduced, the additional strength needed in the lining, the existing foundation conditions, and the space available at the site." Consideration of lining materials is limited to corrugated pipe, plates, and arches.

Points on which specific information is needed for advance planning and conduct of the work are noted at length. Foundations, clearances between old work and new, lining methods and equipment, necessary lengthenings of conduit, backfill and the importance of thorough compaction, uses of cement grout or concrete, backfill headers, and the use of temporary struts or bracing are all noted.

The article is without data or detailed descriptions of procedures. Its value lies in its well organized presentation of factors in a problem more complex than is sometimes realized.

"*Lining Can Save Maintenance Dollars*" by W. T. Adams, *Construction Engineer, Armco Drainage and Metal Products, Inc., THE HIGHWAY MAGAZINE, Middletown, Ohio, December, 1955.*

## More on the Kelly ball test for concrete

Penetration of a standard ball, as a substitute for the slump test for consistency of concrete was studied by E. L. Howard of Pacific Coast Aggregates, Inc., and reported by University of California Professors J. W. Kelly and Milos Polivka to ASTM Committee C-9 at its San Francisco meeting in 1949. Further development of equipment and methods, has been described in various articles, one of which, from the *Journal of the American Concrete Institute* was covered by a digest on page 75 of *ROADS AND STREETS* for September, 1955.

Correlation between ball penetration and slump is very close, as shown in a series of six diagrams in the current article. Advantages of the Kelly

test include the facts that it is easier, simpler and less subject to variable factors than the slump test, is faster, and that it can be made on concrete in place, as discharged from the mixer, or as delivered at the job, with no delay to placing or finishing operations.

The apparatus as designed by Kelly and Polivka has been slightly modified by the Bureau of Public Roads, but with no change in weight or size of ball, or other primary features. The Bureau's design is included in ASTM Tentative Method C360-55T. Detail sketches of both designs are given in the current article. Correlation of tests appears in separate tables for field and laboratory conditions.

"*Use of the Kelly Ball as a Device for Measuring the Consistency of Concrete*" by The Physical Research Branch, Bureau of Public Roads, Reported by William E. Grieb and Robert A. Marr, Jr., *Highway Physical Research Engineers.*

PUBLIC ROADS, U. S. Department of Commerce, Bureau of Public Roads, Washington, D. C., February, 1956. Obtainable from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price 20 cents per copy.

## Safety pick-up for center line markers

The danger to personnel in retrieving tetrahedrons and other temporary markers from pavement center lines is noted, and a machine is described which eliminates the risk almost wholly.

"In general, the equipment consists of a traveling conveyor belt to which flights are attached. The belt operates between an upper drum and a pick-up drum attached to a frame made from six-inch channels. The pick-up drum rotates independently about the axle. Power is taken from the axle and through a series of sprockets and chains. The revolutions of the drum are increased about two and one-half times. Sweeps direct the tetrahedrons into position, flights slap them into the hood covering the pick-up drum, push them onto conveyor belt, and into the truck bed."

The machine was tested last year and its effectiveness proved. Some modifications are planned for future

units. Cost of the first one was about \$400, but it is believed others will be much less.

Six pictures and a full detail drawing complete the short article.

"*Equipment for Picking Up Center Line Markers*" by L. D. Cabaniss, *District Engineer, Texas State Highway Department, TEXAS HIGHWAYS, Austin 14, Texas, December, 1955.*

## Prestress methods for structural steel

Strengthening of existing steel structure usually is accomplished through welded or riveted reinforcement. A cheaper, and sometimes more convenient method is by prestress on the same principles as for concrete. Opportunities in this field have been overlooked mainly because of lack of knowledge and experience.

Design equations are developed to cover the problems of straightening by prestress. Additional study will be required to develop techniques.

"Although by using the equations of elasticity, the force of relaxation can be determined, it is recommended that the prestressing be done in two or more steps. In this way the effect of prestressing the adjacent beams, which are connected to each other by more or less rigid diaphragms, floor beams, etc., can be eliminated. It means, for instance, that all cables be stressed up to 50% of the initial prestressing force in the first step, then up to 100% and finally every cable backchecked for the theoretical prestressing force.

"The ease with which prestressing cables can be placed and anchored makes prestressing particularly suited for strengthening existing bridge structures where the maintenance of traffic during the construction is of great importance. Undesirable vibrations of the cables which can be caused by impacts of the live load or wind should be eliminated by placing vibration dampers at intervals required by computation or by the judgment of the designer."

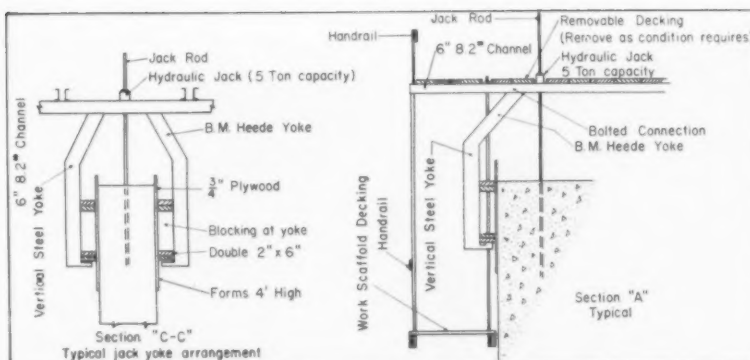
"*Strengthening Steel Structures by Means of Prestressing*" by Rudolph Szilard, Jr., *Senior Structural Designer, Amman & Whitney, Consulting Engineers, N.Y.C., THE ENGINEERING JOURNAL, The Engineering Institute of Canada, 2050 Mansfield St., Montreal, October, 1955.*

## Slipforms for 204-ft. piers

(Continued from page 54)

continued in the same manner as the caps on the other sections. On all three sections the outside cap forms were left in place 48 hours.

• **Checking Alignment.** To keep check on the alignment as the slipform work progressed, three transits were set up, one on each side and one on centerline. Checks were made at approximately 3-hour intervals both night and day. Targets were painted on each side of the form and on centerline for alignment checks and well lighted so they could be seen at night. If a check indicated that the form was drifting off line, steps were immediately taken to bring it back. This was done by carrying the jacks high on the side or end that was drifting off and keeping them high until back on line. The one foot interval marks on the jack rods were used for the measuring point to raise the side or end and the amount to be raised determined by the amount off line. It was found that on the middle and top sections, on the end on which the boom was located, that these jacks should be kept  $\frac{1}{2}$  in. higher than others to offset pull of hoisting concrete and steel.



• Typical arrangement of jack yoke for slipform.

Concrete was furnished in transit mix trucks from a central batch plant located on top of canyon approximately one mile distant. The bottom section of each pier contained 1016 cu. yd. of concrete, the middle section 700 cu. yd. and the top section 292 cu. yd. The first concrete in the bottom section of the first pier was poured December 7, 1955, and the last concrete poured in the top section of the last pier March 10, 1956, using in all a total of 4016 cu. yd. of concrete. About 395,000 lb. of reinforcing.

• **Concluding Comments.** This type of

construction is ideal for tall uniform piers, as it provides for uninterrupted pouring. The moving of the forms guarantees a perfectly monolithic structure. The surfaces are more dense and weather-resistant.

The raising speed, allowing for favorable conditions, should average almost one foot per hour, with the opportunity of a much earlier completion date, than with fixed form construction. There is considerable saving in both labor and materials. It would have been almost impossible to have obtained the same lines and

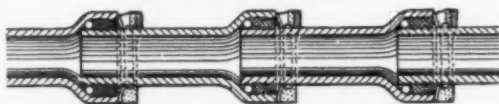


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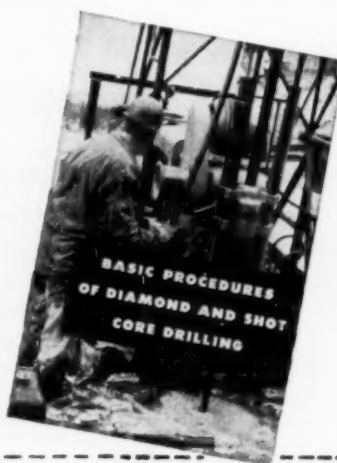
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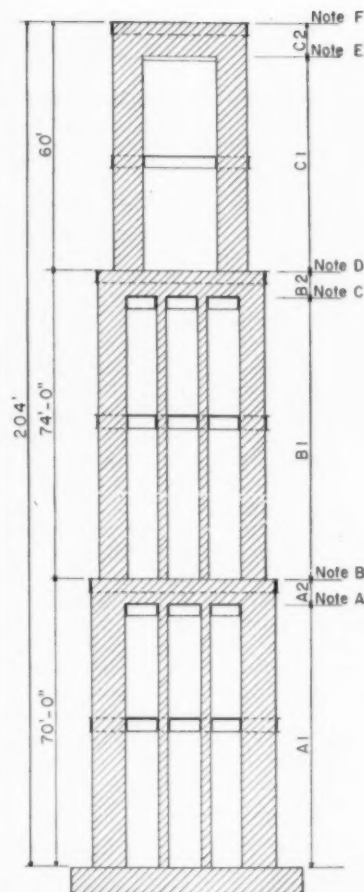
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. . . for more details circle 177, page 16



### ● Section through piers No. 2 and 3

Note A. When reaching this point the inner forms with working decks are detached and fastened to the concrete walls with pins or bolts. The slide casting is still going on and the above mentioned working deck now serve as bottom form for the concrete slab.

Note B. At this level the concreting is finished and the form-raising continues until the forms are entirely free. Then the forms are reduced to the size of the middle lift. Three new wooden inner form "boxes" are mounted.

Note C. When reaching this point the operation procedure is the same as shown below.

Note D. At this level the concreting is finished and the form raising continues until the forms are entirely free. Then the yoke beams and form sections are rearranged for slide-casting of the top part.

Note E. When reaching this point the column inside forms sections are detached and the concrete slab bottom form is laid up in the columns. The hydraulic jacks between the columns are provided with jack rods supported on steel beams between the column.

Note F. At this level the bottom form for the concrete slab between the two columns is built. The form consists of wooden boarding on steel-beams and it can be prebuilt before starting top-part slide-casting and placed above the slide form hanging in the yoke-beams. Thus slab-bottom-form is raised with slide form.

finish with fixed forms as there is no bulging or surface blemishes caused by use of tie rods. All construction joints were eliminated in the three sections except at the bottom of the cap of the top section.

Piers of 40 ft. or higher should be designed to permit the use of the slip-form method. The only major design change necessary would be in reinforcing steel. All hoop reinforcing should be changed either to straight bars, or bars with short hooks as it is impossible to place hoop reinforcing without first cutting and then splicing. This is particularly true when the bars are to be placed in a horizontal position.

Among the many who have taken part on the Pecos River Bridge project are Randle B. Alexander, bridge engineer of the Texas Highway Department and staff, and personnel of the department's Del Rio District under district engineer M. B. Hodges. Grover Sprött, chief inspector for the department, and Eric Hedebe representing B. M. Heede Co. played a leading role in the pier construction here described. D. C. Greer is state highway engineer of Texas.

• Weekend automobile crashes accounted for 15,730 killed and 766,090 hurt during 1955.

### 30-Ton Rear-Dump on Kansas Road Job



• Pictured here is the new Movall unit, Model RD15, teamed up with a Cat DW10 prime mover on a Kansas highway relocation job. Contractor is W. H. Bennett Construction Co., of Kansas City, Mo. Northwest  $1\frac{3}{4}$ -yd. shovel loaded shale, limestone and clay for 500,000 cu. yd. job with 600 to 900 ft. (one-way) hauls with level to 3% unfavorable grades.

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... for more details circle 248, page 16

... for more details circle 184, page 16

# Minnesota Contractors Roam

## Far Afield for Their Jobs

MINNESOTA construction firms, long-time major factors in the contract construction field nation-wide and overseas as well, showed about a 90% increase in volume of work outside Minnesota in 1955, reported the Associated General Contractors of Minnesota, Inc. (AGC).

Projects under construction by Minnesota firms amounted to \$154,605,100 in 21 states, Bermuda, Canada and Newfoundland. Commenting on this figure, Lyell G. Halverson, president of the Minnesota group said, "because members report their volume on a voluntary basis, this figure does not include complete amounts but does give a good indication of the reason why Minnesota and particularly the Twin City area has often been termed the 'Hot Bed' of the nation's construction potential."

AGC of Minnesota, one of the oldest and largest of 124 chapters throughout the nation under the national association, serves its members in many fields such as labor relations, accident prevention, legislation, intra-industry relations, and all other areas wherein the protection and advancement of the contractor and the public are necessary.

### Overload detectors for Indiana Toll Road

Sensitive electronic scales that will weigh a truck axle load moving at 60 mph are being installed on the Indiana-East-West Toll Road.

Designed to detect overloads, the "Weigh-tronic Scales" were developed by Taller & Cooper, Inc. The scales differ from the conventional knife-edge type, levers and other complicated moving parts being eliminated.

The weighing system consists of a 3'x10' platform embedded in a pavement lane or at an entry or exit point. Sensing elements are mounted in a shallow pit below the platform. An electronic unit receives electrical impulses from the sensing elements; when a pre-set level of weight is exceeded, an electrical "brain" sounds an alarm, records the passage of the axle and other pertinent data as to time, entry station, etc.

### Big New York job goes to second lowest bidder

Following recommendations of the New York State solicitor general and with the concurrence of the State Comptroller, the New York State Department of Public Works disqualified Felix Contracting Corporation of Mount Vernon, New York, on a recent bid.

The firm's bid of \$7,066,395 was the lowest bid received March 8, 1956 for a 2.49 mile portion of the New England Thruway and 3.05 miles of access roads in connection.

In awarding the project to A. E. Ottaviano, Inc. second lowest bidder at \$7,125,048, the Department cited the reason for their action as being the lack of sufficient experience of the Felix Contracting Corporation to handle a job of this magnitude. The opinion was concurred in by the New York State Thruway Authority and the U. S. Bureau of Public Roads. No inference was made of any lack of qualification of this firm other than this.

In making this decision the Department of Public Works cited as their guide Section 38, Subdivision 3 of the New York State Highway Law.

This same project had been advertised for 2 bid openings. The February 2 opening, the low bidder, Mount Vernon Contracting Corporation and Wosstroff and Oliver, indicated that they had made a substantial error in calculating their bid. The Department of Public Works decided that in the best interests of the State, all bids should be cancelled and the job readvertised.

### Union pact keeps trucks off Ohio turnpike

John W. Love, special writer for the Cincinnati Post, stated in an article in that paper that a union agreement is one reason why trucks are not using the Ohio Turnpike.

Love points out that what is known as the Ohio rider to the over-the-road agreement for the central states area sets up a schedule of running times to be paid between starting points and destinations. These running times, or hours, are agreed upon for wage purposes between the Teamsters Union and those employees who signed the contract.

If the employer directs his drivers to use the turnpike, he pays the turnpike toll in addition. It costs him extra.

There are other arrangements for paying wages in the truck industry. Companies running their own fleet of trucks, haul their own products and pay for elapsed time. Use of the turnpike results in savings for them. Other methods of payment are based on mileage.

Employers who subscribe to the central states contract on running times, or mileages, are using a schedule that went into effect before the turnpike opened, this arrangement does not expire until 1961, but there is talk of the agreement being modified.

Drivers are paid on the basis of the agreed hours between cities multiplied by the hourly wages. If the employer wants the cargo delivered sooner he simply adds the turnpike toll. What the driver does with the time saved is up to him.

• Tennessee's rural road system is in need of modernization to the extent that only 4,641 miles are entirely adequate for today's traffic, while 10,574 miles are deficient in one or more vital respects. This is the conclusion of a need study recently completed by the Automotive Safety Foundation in a state-wide appraisal. Only 7,950 miles, or roughly half of the system, however, is sufficiently deficient to warrant immediate reconstruction, according to this report.

### Where Minnesota AGC Firms Did Business

|                    |              |                      |            |
|--------------------|--------------|----------------------|------------|
| Bermuda .....      | \$ 2,179,300 | Massachusetts .....  | 7,114,000  |
| Canada .....       | 710,800      | Michigan .....       | 2,111,500  |
| Newfoundland ..... | 10,755,900   | Nebraska .....       | 632,200    |
| California .....   | 14,402,700   | New Jersey .....     | 3,322,700  |
| Delaware .....     | 35,791,600   | New York .....       | 6,325,000  |
| Florida .....      | 1,933,300    | North Carolina ..... | 89,900     |
| Illinois .....     | 18,007,000   | North Dakota .....   | 1,328,800  |
| Iowa .....         | 4,272,100    | South Dakota .....   | 15,364,000 |
| Idaho .....        | 81,000       | Ohio .....           | 1,300,000  |
| Indiana .....      | 518,700      | Vermont .....        | 1,245,300  |
| Louisiana .....    | 12,000,000   | Texas .....          | 8,717,900  |
| Montana .....      | 3,054,600    | Wisconsin .....      | 2,346,800  |

# "Here's why we're swinging to



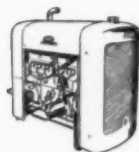
## FORD INDUSTRIAL POWER . . .

We get immediate delivery on most Ford replacement parts and quick, on-the-spot service 24 hours a day. One mixer out of action for a day can cost us close to \$200. With Ford-powered equipment, there's little danger of this happening, for our Ford Dealer is nearby, ready to help us out *when we need it.*"

—MR. E. M. METZEN, Pres.  
E. B. Metzen Co.,  
Center Line, Michigan



*Again, Ford is first choice where service counts*



Metzen—one of the largest Transit Mix Companies in the Midwest—has the plant capacity to turn out 125 to 150 yards of transit mix an hour.

Twenty-eight trucks make up the Metzen fleet—ten more are leased during peak periods.

"King Size" is the word for this operation! And to keep production flowing smoothly, Metzen has just added three more Ford-powered Challenge *Pacemaker* 6-yard truck mixers to its fleet. The *Pacemaker*—powered by a Ford "223" Heavy Duty Industrial Engine—is capable of charging at the rate of seven seconds per yard and takes a back seat to *nobody* in discharging low slump concrete.

Couldn't you improve *your* operation with Ford-

powered equipment? Ford offers you a full line of 4-, 6- and 8-cylinder engines to choose from. Every engine gives you modern, overhead-valve construction. And every engine, except the new super-efficient "220" Diesel, can be easily adapted for use with either butane-propane or natural gas.

And, as the Metzen Company did, you'll find that Ford can serve you better. For a network of newly-appointed Ford Industrial Products Dealers has been set up across the country. Now there's a Ford Industrial Power Headquarters right in your own area.



Write for complete information: INDUSTRIAL ENGINE DEPARTMENT

FORD Division of FORD MOTOR COMPANY, P.O. BOX 598, DEARBORN, MICHIGAN

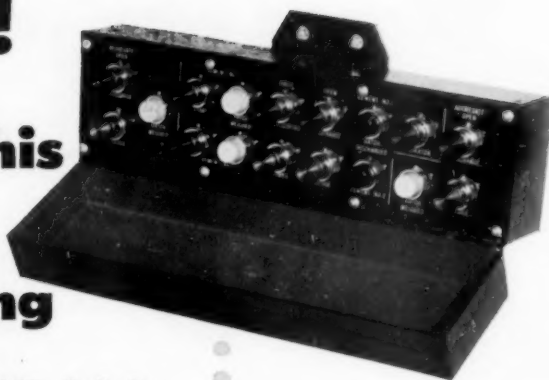
... for more details circle 210, page 16

ROADS AND STREETS, May, 1956

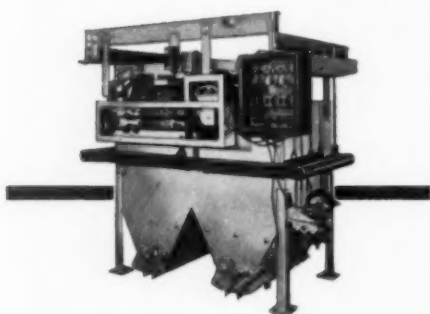
# Roadbuilders!

Just this  Plus this

Do **ALL** your batching



**One Man Operated — The BUTLER 0-1-0  
Roadbuilders Plant Batches Sand,  
Cement, 2 Sizes of Stone,  
Simultaneously and Automatically.**



**MORAL:** The BUTLER 0-1-0's labor saving, high production and remarkable portability cut your costs so sharply, you can bid any job successfully and make a better profit against any competition (except another 0-1-0 owner).

2½ batches a minute more than satisfies the hunger of two 34E dual drum pavers — yet is the production pace which the BUTLER 0-1-0 readily achieves. Only one man — stationed at the cement batcher — to touch a simple set of push buttons — operates any one, two or all three plants.

Master controls for each batcher are pre-set for any specified batch proportion. These are not touched again until the specification changes . . . Gates are



completely interlocked, cannot discharge until correct weights are in the hopper and the batcher cannot be charged until the previous batch is cleared. Every batch is the same . . . no errors, no slow down through operator fatigue.



As your first step toward BUTLER 0-1-0 ownership send for this illustrated Bulletin completely describing the advantages. Get ready — now. Send for Bulletin 0-1-0 today.

## BUTLER BIN COMPANY

959 BLACKSTONE AVENUE

WAUKESHA, WISCONSIN

. . . for more details circle 190, page 16

# Electronics Stole Show at WASHO Conference

*Problems on matters other than the physical roadbed were the chief concern of western highway delegates at Phoenix. Uncertainty over federal highway legislation tempered remarks of many speakers*

**By H. K. Glidden**

AN atmosphere of "uncertain expectancy" pervaded the conference of the Western Association of State Highway Officials, held April 10 to 13 at Phoenix. This meeting was attended by 512 delegates and guests, with Arizona state highway engineer Wm. E. Willey acting as host. Delegates were present from Alaska and Hawaii as well as the 11 Western states.

Wide speculation regarding the provisions and ramifications of an as yet unpassed national highway bill pointed up the need to be ready with men and materials for almost any situation. The great scope of the expected program brought into sharp focus highway matters which had in previous years found little consideration in making up conference agendas. Manpower, employee relations, electronic computers, greater utilization of engineering skills, advance acquisition of rights-of-way, improved enabling legislation and safety — tended to overshadow the more technical topics of design and testing. To a large degree, electronics stole the show, approximately 75 of the delegates taking time out to visit the Arizona highway department's Univac electronic computer installation. It seems safe to predict that future highway conferences will see new faces; men who specialize in methods of improving or conserving human values through the application of electronics, psychology and photography.

The conference brought out the fascinating promises which high-level thinking is giving to every segment of the highway industry. Highway engineers and employees can anticipate a move in the direction of higher wages, greater public recognition, improved working conditions, more fringe benefits, and a widening of responsible job opportunities. Contractors appear to be in line for better contract award schedules, longer projects per contract, more uniform specifications, the benefits of long-range prediction of requirements for construction materials and faster and more accurate estimates by electronic computations.

A. C. Clark, deputy commissioner of public roads, in a noon luncheon speech, keynoted the conference with the statement, "Highway engineering is literally paving the way to a stronger nation. . . . Industry and employment generated by highway transportation and allied activities accounts for about one-seventh of the total value of our gross national product."

Commissioner Clark said that the increasing importance of the profession to the economy and defense of the nation has produced a renaissance in highway engineering. "No longer is the highway engineer visualized as peering through a transit or humped over a drafting table," observed Clark. "Work of this nature is being reassigned

ed to technicians or supplanted by new methods and procedures. The experienced professional highway engineer is gradually being emancipated from these routine tasks so that his productive capacity can be devoted to work of a higher order." This speaker noted that the engineer's position is growing in stature and dignity as he takes his place with the transportation experts of the Nation. His increased responsibilities and the growing demand for his services will also furnish further justification for increased salary scales for highway engineers.

The paper, "Arizona's Experience with Electric Computer," presented by Glen Ryden, chief computer, Ari-

## Want Stockpiled Bridges for Emergencies

The Western Highway Officials at the Phoenix meeting voted resolutions on the following:

- The pending federal road legislation — please get on with it, so as to avoid further confusion and disruption in state highway plans.
- Firm delivery dates and prices on steel and cement, the AASHO, AGC and the state highway departments should hold conference with suppliers, in effort to eliminate escalators.
- Catastrophes that damage highways and bridges — such emergencies could be met more promptly with both civilian and military advantage, if Congress would authorize the Bureau of Public Roads to stockpile bridges at strategic locations.
- Differences between the Bureau and the states — the Bureau's division and district offices should be given more authority to iron them out without going to Washington.
- The growing demand for engineers — salary scales at all levels should be reviewed and every effort made to adjust them upward.
- Highway travel maps — committee action in AASHO requested to bring out uniformity in cartography in the public interest.
- Historical and fossil remains encountered in road construction — a salvage program should be set up to salvage and preserve such relics.
- The forest highway appropriation — Congress should step this up from the present \$22,500,000 annual rate to a sum big enough to allow completion of forest roads to adequate standards.
- Oversize house trailers — as a safety measure they should be limited to 8 ft. width by manufacturers, who now build them as wide as 10 ft.

zona state highway department, aroused unusual interest and discussion. Since Arizona, together with Louisiana, has pioneered the application of electronics to the time-consuming calculations involved in alignment, embankment quantities and traverses, Mr. Ryden spoke on the basis of his actual accomplishments. His opening statement, "The use of electronic computing machines for many engineering calculations in highway work is becoming a reality," took on added meaning to those delegates who watched the flickering lights of a Remington Rand Univac 120 spell out within 3 to 5 minutes the finished grades and alignment for one mile of highway. Mr. Ryden's time studies showed that manual methods would require 9 to 10 man hours for the same computations. Relatively inexperienced key punch operators had previously spent 2 to 2½ hours transferring field notes to the cards, which in turn tell the Univac the problem and type of answer required. Two short steps later and a printed sheet was ready with a tabulation of the original data together with the answer in terms of finished centerline grade, excavation quantities, or other specialized information required. The versatility of the machine is astounding. It takes into account super elevation, vertical curves, spirals and topography with unbelievable ease. Mr. Ryden, working with Remington Rand technicians, recognized that many improvements are in the offing. They haven't been stumped yet, but are tirelessly enthusiastic in their efforts to simplify and expand the computer's usefulness. Mr. Ryden is anxious to pool his knowledge with that of other engineers to hasten general usage of electronic computation in the highway field.

The Univac 120 Arizona uses, costs about \$95,000 or can be rented at \$1,275 per month including service.

It occupies somewhat over 1,000 sq. ft. of floor space, preferably in two rooms. Operation requires one skilled engineer with two to three weeks special training. The number of clerical personnel is low. Arizona also does all their payroll computations electronically.

For offices not having sufficient work volume to warrant an electronic installation, Remington Rand has a special service available whereby data are sent to their service centers for computation.

A wide range of subjects were covered in the conference agenda. Numerous panel discussions provided for an exchange of ideas and opinions. The big names of WASHO were supplemented by outstanding talent from across the nation. Included among others present were: C. D. Curtis, commissioner of public roads; Fred Burgraf, director, Highway Research Board; A. E. Johnson, executive secretary of AASHO, and Honorable Dennis Chavez, U. S. senator and Chairman Senate Public Works Committee.

### Other WASHO Highlights:

- Increasing participation and interest was shown by various state road commissions, including two new comers on WASHO's executive committee. To quote Senator Walter C. Leth of the Oregon legislature, "I am somewhat surprised to find that this is a hard working conference. From now on I intend to encourage Oregon sending as many of its highway people as possible."

- Outgoing WASHO president J. R. Bromley issued the timely warning that everyone connected with highways faces the greatest challenge in roadbuilding history. "We have asked for this expanded highway program," Bromley said. "We have promoted it because we know its desperate need. We cannot afford to fall short of the goal."

- A more tolerant "Wait and see" attitude was evident towards the claim of special interest groups with respect to new legislation. To quote President Bromley, "There has been too much jostling in the street and not enough pulling in the same direction for the best interests of the highway user."

- Photogrammetry's future expanded role was again spotlighted in its new close relationship with electronics for speeding up highway engineering. A. C. Clark, in this connection, called attention to the recent Chicago conference.\*

- The general assembly heard a detailed discussion of the WASHO test road report, on which panel speakers gave a number of frank answers. The consensus seemed to be that not enough time has elapsed, and with not enough severe winters to warrant definite conclusions on many points. Frequent references was made to the Binkelman Beam as an important testing tool to come into prominence through this project.

President of WASHO for 1956, is D. C. Greer, state highway engineer of Texas. New vice president is Wm. E. Willey, state highway engineer of Arizona; secretary-treasurer is H. B. Glaisyer of Oregon. Elected to the executive committee are J. B. Bromley, Wyoming (retiring president); H. J. Corleissen, Utah state road commissioner; T. J. Heimann, chairman, New Mexico highway commission; H. D. Mills, state highway engineer of Nevada; and W. C. Williams, deputy state highway engineer of Oregon.

\*See editorial, "Electronics and Our Changing Profession," *ROADS AND STREETS*, April, 1956.

### Heavy tractor shovel removes concrete

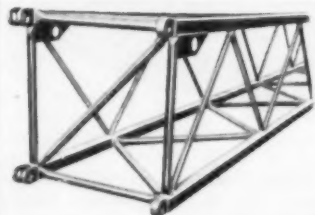
Facing a job of concrete pavement removal where use of a breaker ball was forbidden by authorities, contractor Robert E. Latimer Jr., Silver Spring, Maryland, utilized a rubber-tired loader. A decayed 14-in. gas main lying beneath the 8-in. slab decreed that no pounding or dropping of heavy weights be used to break up the 12 ft. widths of concrete.

After several experiments, Latimer used a Michigan 175A loader to break out the concrete and load it on trucks for removal. The bucket cutting edge was slipped under the slab and bucket action applied, lifting the slab about 2 ft. As the loader moved forward, the bucket was raised, gradually breaking up most of the concrete.

- Giving the "heave-ho" to a section of pavement on contractor R. E. Latimer job.



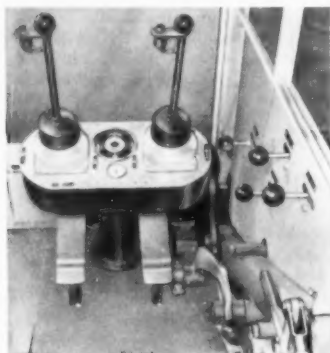
# 3 NEW LORAIN FEATURES



## SQUARE TUBULAR BOOM\*

Lighter,  
Longer,  
Stronger!

Greater strength at reduced weight. Permits increased lifting capacities, working with longer booms, raising longer booms from flat position and traveling with longer booms over the rear.



## 2-LEVER METERED AIR OPERATION\*

Easier,  
Faster,  
Simpler!

Now, only 2 levers, instead of 3 or 4, for all turntable operations. "Air-Ease" power controls all friction clutches. Reduces operator effort, increases production.

## "SHEAR-BALL" MOUNTING\*



No Center Pin or Nut, No Rollers, No Adjustments!

Provides smooth, solid "ball-bearing" swing. Field tested for 5 years... hundreds in use. There's nothing else like it in shovel-crane use today!

\*Not standard equipment on all models

... THAT WILL GIVE  
YOUR SHOVEL-CRANE  
ADVANTAGES

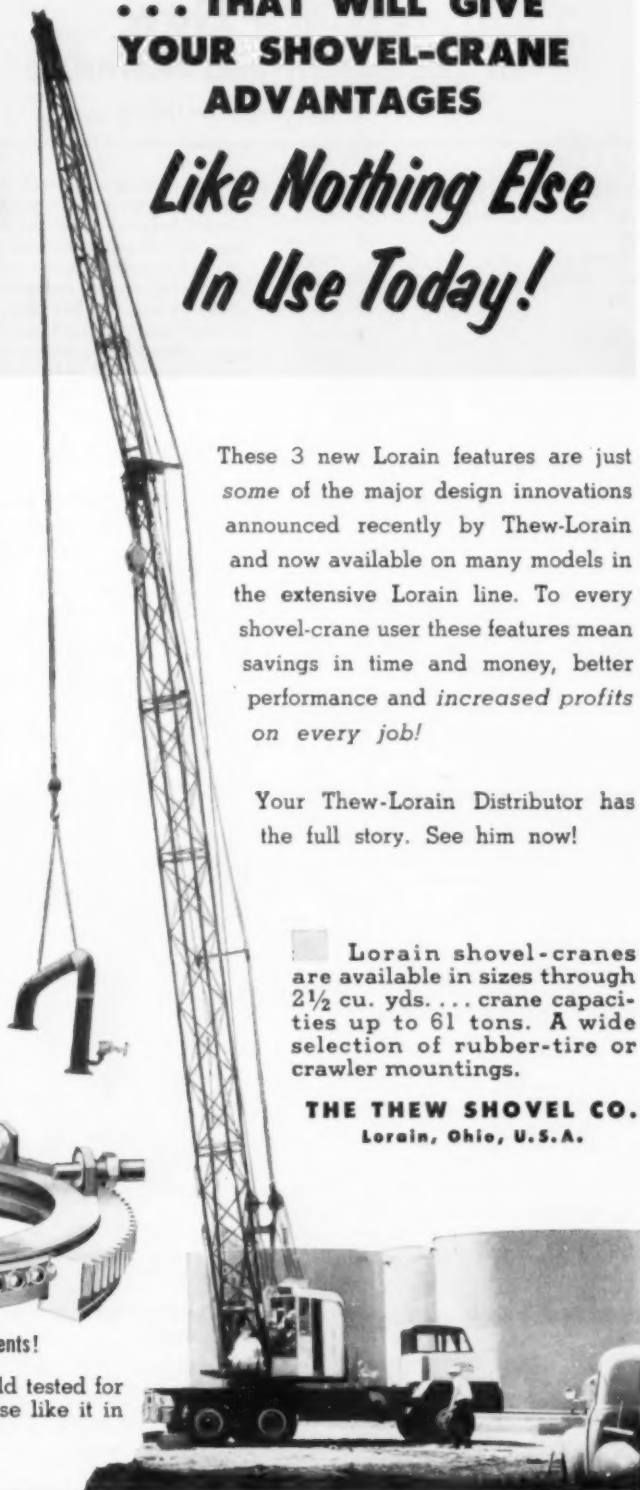
*Like Nothing Else  
In Use Today!*

These 3 new Lorain features are just some of the major design innovations announced recently by Thew-Lorain and now available on many models in the extensive Lorain line. To every shovel-crane user these features mean savings in time and money, better performance and *increased profits on every job!*

Your Thew-Lorain Distributor has the full story. See him now!

Lorain shovel-cranes are available in sizes through 2½ cu. yds. ... crane capacities up to 61 tons. A wide selection of rubber-tire or crawler mountings.

**THE THEW SHOVEL CO.**  
Lorain, Ohio, U.S.A.



# THEW-LORAIN®

... for more details circle 260, page 16

ROADS AND STREETS, May, 1956

# What's New in Equipment and Materials

Readers Service Coupon on Page 16

## Screed Has Telescopic Beam

A new heavy-duty vibratory screed, now in production by Creative Metals Corporation, 1290 Powell St., Emeryville, Calif., has a telescoping beam feature.



New Vibrating Screed

By simply loosening several bolts the shoe-plate and rigid main frame can be telescoped to give any desired shoe-plate contact from 22 ft. 6 in. to 36 ft. wide in fractional inch increments if necessary with one set of beams and from 15 ft. 6 in. to 23 ft. with a second set. Both beam sizes fit the same end-trucks and engine mounts. In this manner the screed is quickly adjusted to prevent the shoe-plate from riding on the forms even when working on difficult curves. Shock mountings at the end-trucks and engine mount protect both engine and forms from the 10,200 vibrations per minute developed by a 3.6 hp engine.

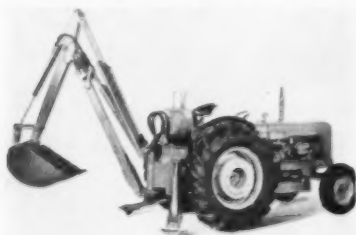
For more information circle 106 on Service Coupon Page 16 and mail now.

## Tractor Mounted Backhoe

A hydraulic backhoe, specifically designed and built for attachment to Fordson-Major tractors, has been introduced by Sherman Products, Inc., Royal Oak, Mich. It is a heavy duty unit which reaches as deep as 12½ ft. With a 180 degree arc of swing it can clear a height of 8 ft., 8 in., for loading trucks.

An important new feature of this machine is twin crowd cylinders for extra balanced power permitting fast, efficient digging through any soil.

The digger has heavy steel plate construction, large diameter hinge pins, re-



Sherman Major Power Digger

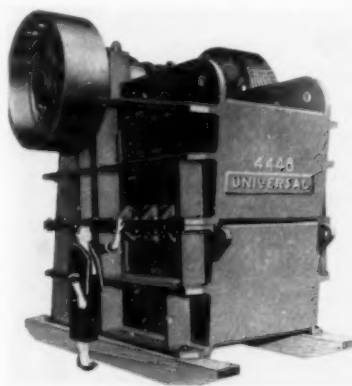
placeable hardened steel bushings and heavy duty steel castings. Also, there are newly designed dipstick, boom, cylinders, bucket and sub-frame assembly.

A new bucket linkage provides maximum wrap-around and also a powerful stroke up to 5,000 lb., effective pressure, through nearly 9 ft. of bucket lip travel. Steel cable linkage between two opposing, long-stroke, double, acting hydraulic cylinders provides smooth, positive control of swing action.

For more information circle 107 on Service Coupon Page 16 and mail now.

## Overhead Eccentric Jaw Crusher

A new overhead eccentric jaw crusher, the 4448 "WRB," announced by Universal Engineering Corp., 625 "C" Ave., N. W., Cedar Rapids, Iowa, possesses these design features: stress-relieved, welded-steel base; extra-long jaws, stationary, 102 in.; movable: 115½ in.; spherical self-aligning bearings hydraulically removed; rocker-type steel toggle plate, steel-plated shims and hydraulic cylinders. Approximate capacities range from 200-350 tons per hour at a 4 in. discharge opening to 800-950 tons per hour at the maximum 12 in. opening.



Universal 4448 Crusher

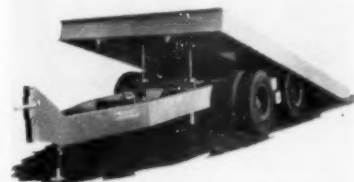
For more information circle 108 on Service Coupon Page 16 and mail now.

## Trailer for Construction Equipment

A new, heavy duty tandem axle "Tilt-Top" trailer with 13 ton capacity, has been announced by Miller Tilt-Top Trailer Co., 432 S. 92nd St., Milwaukee, Wis. This new model was designed, the manufacturer reports, to provide the faster loading and unloading features of a tilting platform trailer for hauling such equipment as smaller shovels, "Barber-Greene" trenchers and finishers, backhoes and crawler tractors up to 26,000 lb. gross weight.

Miller engineers explain that great structural strength is achieved both by massive construction and an arrangement in design whereby the heavy tongue extends way back to the rear set of wheels giving double frame strength under the area of greatest load concentration.

A very low over-all platform height (33 in.), for a trailer of this type, is obtained by placing the pivot point of the



Model "OT"-13 "Tilt-Top" Trailer

big platform toward the rear of the tandem axle assembly. The platform measures 8 ft. x 16 ft. 8 in., and is decked with 2 in. oak. Its tandem axle walking beam is designed for independent wheel on each side, assuring less jarring and a more level ride on rough terrain.

Designated the Model "OT"-13, the new "Tilt-Top" includes as standard equipment the platform and eight 7.50 x 15, 12-ply tires. Among the optional equipment offered is a twin hydraulic tilt control, electric brakes, lights and safety chains.

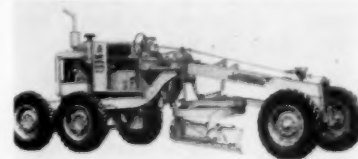
For more information circle 109 on Service Coupon Page 16 and mail now.

## New 60 HP Adams Grader

A new motor grader, the Adams "220," announced by LeTourneau-Westinghouse Co., Peoria, Ill., is powered by a 60 hp diesel and weighs 14,865 lb.

Among the new features in the "220" is a teaming of hydraulics and mechanics in an exclusive hydra-power gear system which powers both lift and lateral shift of the blade. A simple system employing hydraulic power for ease of operation and mechanical torque for speed and positive action, it uses gears to convert the thrust of hydraulic rams to mechanical turning power. Because these gears provide a 3 to 1 multiplication, the operator is stated to be able to get three times the movement ordinarily accomplished by conventional ram action. The result is that the blade of the "220" can be moved from a ditching position to full vertical bank cutting on either side in one continuous movement without the need for indexing and re-indexing.

The standard sliding-gear transmission provides 5 forward speeds from 1.8 to 18.3 mph. The optional creeper gears add four more speeds from .28 to .96



New Adams' "220" Motor Grader

mph, for finish-grading in tight places, tough rooting jobs and other difficult applications where it might otherwise require slipping the clutch or reducing engine power to permit the necessary slow operation.

Other important features include a hydraulic-mechanical circle reverse mechanism which revolves the blade under the scarifier block to any angle within a full 360°; power-controlled leaning front wheels; and hydraulic brakes on front tandem drive wheels with mechanical parking brake on transmission.

The "220" specifications lists its length as 22 ft. 9 in., its width 7 ft. 3 in. The 60 hp diesel power plant is a 2-cycle, GM 4-51.

Optional equipment includes 10 and 12 ft. power-shift and 12 ft. slide shift moldboards, 9-tooth scarifier, creeper gears, and top — with or without enclosures.

For more information circle 110 on Service Coupon Page 16 and mail now.

### 900 Ft. Compressor; 5½ In. Rock Drill

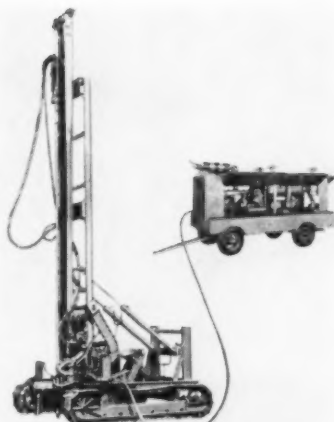
Two pieces of heavy duty equipment for contractors, rock quarries and open pit mines, have been announced by Gardner-Denver Co., Quincy, Ill. One is the rotary 900 portable compressor that delivers 900 cu. ft. of air power per minute. The other is a 5½ in. percussion rock drill, stated to introduce an entirely new rock drill class.

The Gardner-Denver Rotary 900 portable compressor is similar in design to the Gardner-Denver Rotary 600 which has been serving on all types of work. The 900 is a 2-stage compressor with normal operating pressure of 100 lb. per square inch. The design is simple, and all parts of the machine can easily be inspected and maintained in the field.

The Model DH143 5½ in. rock drill is similar in design with the 4½ in. drill announced last year. This new and larger rock drill has a 5½ in. hammer diameter, and provides extra power for handling large size bits, and for fast penetration in hard rock.

The Model DH 143 5½ in. drill offers the user a selection of bit sizes (¾ in. to 5 in.) for achieving best spacing and fragmentation efficiency in many rock breaking applications. A special line of carburized sectional drill rods, couplings and shanks has been developed by the Gardner-Denver Co., for use with the DH143.

The DH143 is furnished with an air-powered crawler mounting which is self-propelled and highly maneuverable over rough ground. The chain feed drilling mast accommodates 20-ft. rod changes, and can be hydraulically adjusted to drill toe holes at 15° below the horizontal. The unit will drill horizontal face holes as high as 8 ft. above the floor. When set to drill at 10° above the horizontal, bit enters the face at a height of 10 ft. The drill and mast may also be



New Rotary 900 Portable Compressor  
and Model DH 143 Rock Drill

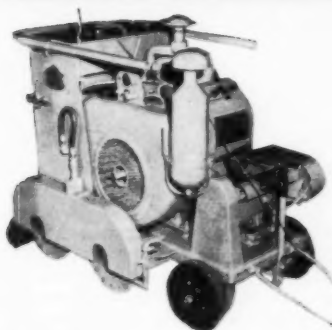
mounted on the user's heavy-duty diesel tractor.

For more information circle 111 on Service Coupon Page 16 and mail now.

### 18 Cu. Yd. Scraper

A new 18 cu. yd. scraper, the Model C Fullpak, announced by LeTourneau-Westinghouse Co., Peoria, Ill., is stated to embody all the dependability of earlier models in a new design which is the result of more than two years of exhaustive field studies to determine equipment owners' needs and desires.

### CUTCRETE TRAIL BLADE SAWS THE CONCRETE SAWS THAT DEFY COMPETITION



Model  
**SUPER S-T-T**  
PAT. PEND.  
**HEAVY DUTY**  
**"STEP**  
**CUTTING SAW"**

Powered by 25 H.P. Engine.  
Blade Guard Capacity: 2 -  
14" Blades and 4" cutting,  
or 1 - 24" Blade and 8"  
cutting optional.

The Concrete Cutting Saw without equal for speed and economy. Cuts nearly **TWICE AS FAST** as single blade machines — reducing man-hours accordingly. Gives longer blade life — for greater economy.



**PROOF — By**  
**FREE DEMONSTRATION**  
WRITE TODAY for further information and literature covering Complete Line of 8 CUTCRETE Models.

**DEALERS DESIRED IN**  
**SOME AREAS**

### CUTCRETE MFG. CORPORATION

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... for more details circle 288, page 16

### SAVE MONEY BY RENTING THE MULTIPLE BLADE JOINT SAW



For PERFECT SAWED PAVEMENT JOINTS  
**CUTS A 2" DEPTH HIGHWAY JOINT —**  
**IN LESS THAN 2 MINUTES**

#### OUTSTANDING REASONS FOR JOINT SAWING:

1. Permits continuous pouring. 2. Requires less men on the job. 3. Controls random cracking and spalling by releasing the tension on full width of pavement. 4. Multiple saws always keep pace with any job. 5. RESULTS: Cheaper and better joints, longer life and smoothest riding roads.

12' — 24' and 25' Saws with 4 to 16 blades in tandem. A saw for any job.

#### J/S TIE BAR SPRING CLIP SYSTEM

Saves up to 80% of labor and time in setting up forms and stripping.

**SAVE MONEY BY RENTING** either or both of these **JOINT SAW TWINS**.

**DEALERSHIPS OPEN — WRITE FOR DETAILS**

### JOINT SAW CO.

30 EAST SANTA CLARA

PHONE: Douglas 7-3563

ARCADIA, CALIFORNIA

... for more details circle 289, page 16



Steel sheet pile stubbornly set in hard rock in constructing the Buggs Island Dam across the Roanoke River in southern Virginia breaks loose under the blows of a McKiernan-Terry E4 Double-Acting Pile Extractor. McKiernan-Terry Corporation, 30A Mercer St., Dover, New Jersey.

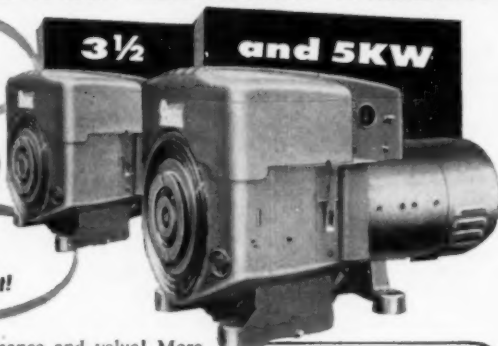
... for more details circle 231, page 16

## New ONAN CCK Electric Plants

**MORE  
OUTPUT**  
per pound of weight!

**MORE  
OUTPUT**  
per gallon of fuel!

**MORE  
OUTPUT**  
per dollar cost!



Way ahead in performance and value! More powerful, two-cylinder, air cooled Onan gasoline engines of 4-cycle, horizontally-opposed design give smooth, quieter, effortless performance. Short stroke and moderate speed cut engine wear, give longer life. Quality features include rotating Stellite-faced exhaust valves, solid Stellite valve seat inserts, full pressure lubrication. Onan's exclusive Vacu-Flo cooling system available for difficult or "buried" installations.

Completely Onan-built, with Onan gasoline engines direct-connected to Onan all-climate generators in compact, rugged units. Available in stationary, portable and standby models with a wide range of accessories.

Write for folder on all CCK models



**D. W. ONAN & SONS INC.**

3772 University Avenue Southeast, Minneapolis 14, Minnesota

... for more details circle 237, page 16

For faster loading, better boiling and bigger loads, the new Fullpak scraper is built wider and lower than the company's previous Model C scraper. Despite this and its correspondingly lower center of gravity, the new machine actually has greater ground clearance than its predecessor.

Precision operation is stated to be easily and quickly achieved by powerful, fast-acting electric motors triggered by finger-tip switches. Control tower visibility gives the operator a clean, clear view of his blade, load and pusher without standing or stretching. The gooseneck yoke of the machine is specially designed and angled so as not to restrict the full 180° turning ability of the prime mover.

The new 18-yd. bowl increases heaped capacity more than 12% over that of the previous Model C while retaining the same struck capacity. In providing the increased capacity, the new design includes a number of features claimed to add up to quicker, easier loading and unloading. A longer blade cuts a wider swath. The broader, longer bowl interior eliminates the problem of forcing dirt up high in a narrow column. Side sheets and floor of the bowl are clean and smooth to hold loading resistance of material to an absolute minimum. The floor of the scraper stays nearly flat in loading. With only a tilt, material does not have to travel "uphill" to get into the bowl.



Fullpak 18 cu. yd. Scraper

To further speed and aid the loading operation, the engineers who designed the new scraper incorporated two features to enable it to get maximum efficiency from its pusher. The first is an extra low push block specifically built to match push plate height of tractors now in the field. The second is the matching of scraper load speed with pusher speeds. When the scraper's engine is turning at its full rated working rpm's (2000) first gear with sliding gear transmission provides a speed of 2.9 mph. Low range constant mesh torque converter transmission at the same rpm's gives 2.2 mph.

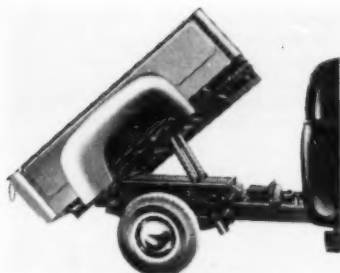
In addition to the low loading speed, the transmission options on the Fullpak provide complete speed ranges with top speeds as high as 30 mph. Prime mover engine options are the 208 hp GM 6-71, 2 cycle, 6 cylinder, or 200 hp Cummins HBIS-600, 4 cycle, 6 cylinder.

For more information circle 112 on Service Coupon Page 16 and mail now.

### Hydraulic Hoists

Two new hydraulic hoists, designed for installation on 1/2, 3/4 and 1 ton trucks, have been announced by Hercules Steel Products Co., Gallion, Ohio.

Called the "300 Series," the new hoists are designed for mounting on trucks with



Hercules "300" Series Hoist

either straight or raised frames. They can be mounted under pickup bodies, platform bodies up to 9 ft. in length or 8 ft. 2-yd., light duty dump bodies.

Model 330, suitable for installation on trucks with cab-to-axle dimensions of 46 to 60 in., has a rated capacity of up to 4 tons, depending on body length and pivot. Dumping angle is 40 degrees.

Model 340, with a rated capacity of up to 5 tons, depending on body length and pivot, is used on trucks having cab-to-axle dimensions of 60 to 72 in. Dumping angle is 45 degrees.

For more information circle 113 on Service Coupon Page 16 and mail now.

#### Hydraulically Powered Drilling Unit

A new hydraulically powered drill, Mobile Drill Model B-40, has been announced by Mobile Drilling, Inc., 960 N. Pennsylvania St., Indianapolis 4, Ind. Engineered to operate as a core or auger drill, the B-40 may be adapted for tractors and vehicles or independently driven by a motor mounted at the rear of any vehicle. For hard formations, either air or water may be used with hollow-stem augers. The drill cores to 200 ft. and augers to 75 ft. as tested by the factory.

A 15 hp hydraulic motor is geared to high torque low speeds and assures a positive, steady drill action. One-man



Mobile Drill Model B-40

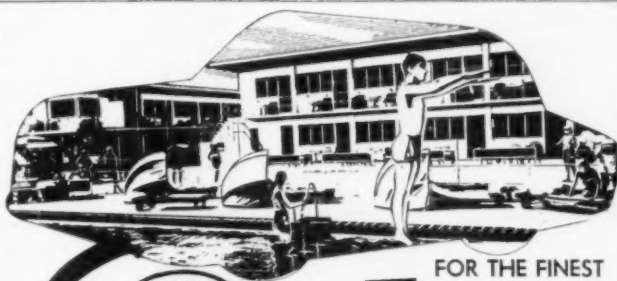
## Baker River dam site uses seismic survey to map bedrock

Puget Sound Power & Light Company's proposed dam on the Upper Baker River in the state of Washington, lay in rugged country. Stone & Webster, engineers for the job, called in Gahagan to make a preliminary sub-surface investigation. Problem was to determine bedrock elevations at the site of the embankment adjoining the dam. A Gahagan Seismic Survey Crew, using portable equipment, completed the assignment in eight days. They provided a profile of widely varying bedrock that could not have been duplicated by other means without a much greater expenditure of time and money. Gahagan Seismic Surveys routinely save design engineers time and money, provide more information in construction of dams, highways, power plants, bridges, etc. Write for Bulletin 3, Geophysical Survey Division, Gahagan Dredging Corporation, 90 Broad Street, New York 4, N.Y.

Established in 1898, Gahagan is a leader in hydraulic dredging

ANOTHER  
**GAHAGAN**  
CASE HISTORY

... for more details circle 213, page 16



FOR THE FINEST  
VACATION EVER!

**AAA**  
*Sunny Isles*  
MOTEL

ON THE OCEAN at 163rd Street

**BEST VACATION BUY**

Now you can stay in America's finest vacationland at these LOW prices!  
Fun for everyone — Private beach and pool — Wading Pool and Playground for children — Completely Air-Conditioned.  
Finest facilities and accommodations.

MINIMUM  
RATE

**\$2.50** To June 15  
To Sept. 15th, **\$3**  
(Per Person, Double)

Write Today for Reservations

**Miami Beach**

16525 Collins Avenue, Miami Beach 41, Florida

## No Auxiliary Power Equipment with

# SYNTRON

## DIESEL PILE HAMMERS



- Easily attached to swinging leads of diesel cranes.
- Quick conversion of crane to mobile pile driving rig.
- Heavy-Duty, rugged construction for driving concrete, steel or wood piling.
- In capacities from 5,000 to 20,000 ft. lbs. per blow.



## Other SYNTRON Equipment of proven dependable quality GASOLINE HAMMERS

### ROCK DRILL

2000 powerful blows per minute with automatic rotation of drill steels. Drills 2 feet per minute.



### PAVING BREAKER

100% self-contained, the Paving Breaker is good for busting, cutting, digging and tamping.



Write for Free Catalogue Data

## SYNTRON COMPANY

384 Lexington Ave.

Homer City, Penna.

operated, it can be converted easily to drill at any degree in a 360° angle, and is light enough for air transport to remote areas. The drill has the proper rpm to give the high torque necessary for auger drilling and by using 5-ft. sectional augers of various dimensions, holes may be drilled quickly, with resulting speed-up in exploration of formations. The Model B-40 fits on the back of any vehicle.

For more information circle 114 on Service Coupon Page 16 and mail now.

## Variable Weight Tandem Roller

A new 8 to 12 ton variable weight tandem roller, announced by Shovel Supply Co., Dallas, Tex., is equipped with rigidly constructed one-piece steel frame, heavy duty 6-cylinder gasoline or diesel engine, torque converter, two-speed transmission, instantly reversible clutches and 200-gal. water tank. Timken, ball and roller bearings are used throughout.

The two-speed transmission, in conjunction with the Allison torque converter, gives an infinite variety of speeds from 0 to 5½ miles per hour. Rolls are constructed from high carbon steel plate, machined to perfect smoothness, with edges rounded to prevent marking. Compression roll is 60 in. in diameter, 54 in. wide; ballasted with water, a pressure of 287 lb. per inch of width is obtained.



New 8-12 Ton Roller

For more information circle 115 on Service Coupon Page 16 and mail now.

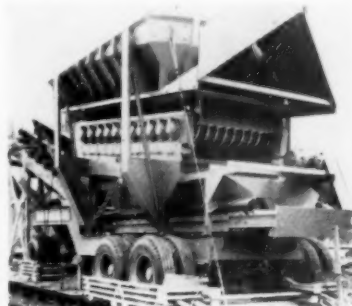
## Feeder Feeds and Scals in One Operation

A new feeder, The "Wobbler," announced by Universal Engineering Corporation, 625 "C" Ave. N. W. Cedar Rapids, Ia., performs feeding and scalping functions in one operation, stated to supplant in many operations the conventional feeder-screen combination.

Patented elliptical bars of manganese steel form the bed of the feeder and by alternate horizontal and vertical positioning impart a rocking, tumbling motion to materials. "Wobbler" action causes fines to be extruded through the bed to a conveyor belt as the oversize is cleaned of adhering material and fed to trucks or directly to the crusher.

Design features: spherical self-aligning bronze bearings on all Wobbler bars with anti-friction bearings for all drive parts; requires no more than 15 hp.; size of scalped product controlled without expensive mechanical changes; lubricated by self-contained splash and bath system.

Capacities: up to 2500 tons per hour depending on driven speed, Wobbler spacing and character of material handled.



Universal "Wobbler" Feeder

For more information circle 116 on Service Coupon Page 16 and mail now.

### Power Buggy

A new power buggy, announced by Creative Metals Corporation, 1290 Powell St., Emeryville, Calif., incorporates automotive type drive and instantaneous direct shift from forward to reverse.



Cmetco Power Buggy

In addition to being safe and easy to handle, it is said to have remarkable ramp maneuverability, being able to turn around within a radius of its own length; it can back down when necessary or be safety-lock braked while carrying maximum load. It is heavily powered and climb-load rated at 1450 lb. on a 35% grade and 2250 lb. on a 25% grade with ability to stop with load, pick up load and resume climb. The heaped capacity of the buggy is 13½ cu. ft., and its maximum travel speed empty is 17 mph.

For more information circle 117 on Service Coupon Page 16 and mail now.

### Flasher Safety Light

A new heavy duty flasher safety light, said to provide 60 to 90 days of continuous operation without servicing or battery replacement, has been announced by R. D. Fageol Co., Kent, O.

Designated Model D-2, the new warning light is powered by a heavy duty 6-volt 8-cell dry battery developed especially for use in Fageol flasher safety lights. The new battery has more than twice the service life capacity of 4-cell batteries, provides a more stable current flow, maintains a steadier flashing rate and cuts battery replacement servicing costs, the manufacturer states. Battery cost per hour of operation with the 8-cell unit is said to be substantially less than with 4-cell batteries.



Model D-2 Flasher Safety Light

For more information circle 118 on Service Coupon Page 16 and mail now.

# GET TOUGH CONCRETE



The toughest punishment handed to concrete is on highways. Correct curing is the vital factor in making concrete tough. Reinforced waterproof paper is *proved* the best curing medium\*. Sisalkraft paper is the No. 1 choice on highways — and all types of commercial and industrial building — throughout U.S.A. American Sisalkraft Corporation, Dept. RS-5, Attleboro, Mass.

\* Send for Concrete Curing Bulletin CE2.

# WITH TOUGH SISALKRAFT

Waterproof, Reinforced Paper

... for more details circle 183, page 16

## Log Handling Unit With Power Shifting

A new log handling unit, Michigan Model 175 tractor logger, introduced by Clark Equipment Co.'s Construction Machinery Division, Benton Harbor, Mich., features the Clark-engineered and built power train, with a heavy duty torque converter, power shift transmission and planetary wheel drive and steer axles.

The rubber-tired logger lifts 20,000 lb. at zero m.p.h.; at 4 m.p.h., it is rated at 14,000 lb. Two specially designed Log clamps can handle a log 6 ft. in diameter, or several smaller logs. Hydraulically operated, they close to 16 in., or can be adapted to close entirely.

When fully raised to a height of 11 ft., 7 in., the 3-ft.-long lifting forks can

be tilted downward at a 39 degree angle, enabling the operator to reach over a row of logs for pick-up. Spikes on the bottom and top sides of the clamps permit the operator to pull a log in or flip it away.



Michigan Model 175 Tractor Logger

For more information circle 119 on Service Coupon Page 16 and mail now.



No clutter or confusion at paving site. Premixed concrete delivered by Dumpcretes ready for placing.

## PAVING ON THE OHIO TURNPIKE

### Non-agitated Hauling Meets Every Test

On sections C-2 and C-3 of the Ohio Turnpike there's no clutter at the paving site. No paver, no water trucks, no men to run them.

Just spreaders and finishers, plus a Dumpcrete or two discharging 4 yards of premixed concrete in 60 seconds.

The automatic central mixing plant is midway on the 10-mile job. Three men run it. 14 Dumpcretes haul its 95,000 yd. production.

Here's the bonus. The single plant supplies concrete for bridges, culverts, walls and widening as well as paving.

"It's an efficient, high-production operation. We like it," says D. W. Winkelman, contractor.

This method cuts costs on small jobs, too. It's approved by 25 state highway departments. Write for bulletins today.



Central mixing plant located midway on job.



Slump, cylinder, beam and air test (above) all O.K.

Maxon Construction Co., Inc., Manufacturing Div. 9  
2600 Far Hills Building, Dayton 9, Ohio

Send Me ☐ Paving on the Ohio Turnpike ☐ 8 Ways to Set Up For Central Mixing

Name \_\_\_\_\_

Firm \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_

**MAXON  
DUMPCRETE**

Fastest from plant to pour

... for more details circle 234, page 16

## Tamper Tamps 10 In. Ditch

A new Blue Brute WTN-18 triplex ditch tamper has been placed on the market by Worthington Corporation, Harrison, N.J. The modern design and narrow construction of the new tamper permits triplex tamping of ditches as narrow as 10 in.

Made of selected and heat-treated steel, the medium weight class tamper is a field developed design with three W-18's, and is rigidly mounted on a triplex frame.

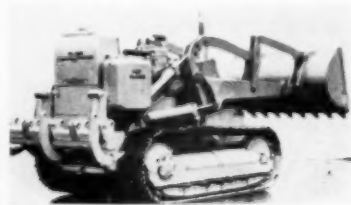
Due to adjustable handlebars on an extension pipe operators can tamp ditches to 48 in. deep while working at ground level.

For more information circle 120 on Service Coupon Page 16 and mail now.

## Retractable Hydraulic Scarifier

A new retractable hydraulic scarifier, now in production by American Tractor Equipment Corporation, 9131 San Leandro Blvd., Oakland 3, Calif., is designed especially for Caterpillar Traxcavator Models 977, 955 and 933.

A rigid single-unit assembly consisting of drawbar and cylinder supports bolts on the rear of the Traxcavator. Unit does not interfere with lubrication or servicing of tractor clutch, battery, etc. Two cylinders raise and lower the heavy-duty frame which accommodates up to five curved scarifier shanks. Shank connections are pinned and may either be rigidly locked for bank ripping, etc., or "hinged" to retract automatically when head frame is lifted. They are ready to rip instantly when lowered by the bucket dump lever; an added valve diverts action to the scarifier. Head frame will accommodate many other attachments. Correctly-designed shank digging angle provides fast penetration down to a maximum 14 in. ripping depth. Curved shank design rolls material up and back of head frame for efficient scarifying with no clogging.



Retractable Hydraulic Scarifier

For more information circle 121 on Service Coupon Page 16 and mail now.

## Form Treatment Gives 12 Re-Uses

Development of a new protective finish for plywood forms used in masonry construction, designed to reduce form maintenance costs and to expedite handling, has been announced by L. Sonneborn Sons, Inc. Called Form-Saver, the new finish is a blend of synthetic resins in fast-exaporating solvents. It is free of grease, wax, oil, shellac or varnish.

For more information circle 176 on Service Coupon Page 16 and mail now.

**ANNOUNCING CATERPILLAR'S**

**NEW NO. 463**

**LOWBOWL SCRAPER**

(four wheel, crawler drawn)

**25 cu. yd. heaped 18 cu. yd. struck**



**11 Reasons Why the No. 463 Delivers  
Bigger Loads at Lower Costs per Yard!**

1. **Lowbowl design**, a new concept developed by and exclusive with Caterpillar, loads more material with less resistance clear to the end of the loading cycle.
2. **Large capacity** without using sideboards—25 cu. yd. heaped.
3. **Easy, fast loading** of full, heaping loads.
4. **Large apron opening** for speedy, easy ejection of sticky material.
5. **Positive 'dozer-type ejection** that sweeps the bowl clean and allows fast, controlled dumping.
6. **Flat bottom** for smooth, level cuts—excellent on any finishing job.
7. **Good digging action** with stinger bit.
8. **Wheels track within cutting edge** for level cuts.
9. **Adjustable rear axle height** that allows bowl leveling with unevenly worn rear tires.
10. **Rugged construction** with high-strength steels for long life, low maintenance costs.
11. **New tubeless tires** for greatly reduced tire maintenance costs.



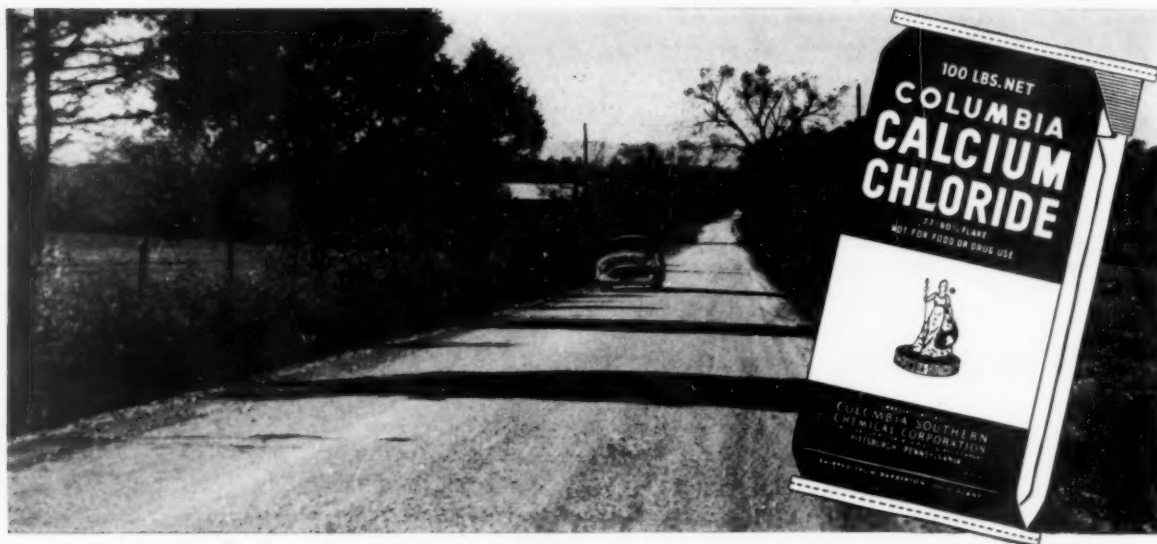
For bigger production at lower cost on shorter hauls, here's a new CAT\* earthmover—the No. 463, featuring Lowbowl design. From stinger bit to ejector, this new scraper is engineered to load, haul and dump with maximum efficiency. You can count on it to deliver top performance with a minimum of down time on your toughest job. For complete information about the No. 463, see your Caterpillar Dealer!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

**CATERPILLAR\***

\*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**NEW NO. 463 SCRAPER—  
LATEST EXAMPLE OF CATERPILLAR  
LEADERSHIP IN ACTION**



# Dustless roads for less money with COLUMBIA CALCIUM CHLORIDE!

- please residents by stopping dust
- provide a smooth, durable surface
- conserve aggregates, cut costs
- reduce the number of bladings

The all year performance and maintenance requirements of unpaved roads are largely dependent upon the conditioning and calcium chloride treatments made during the Spring.

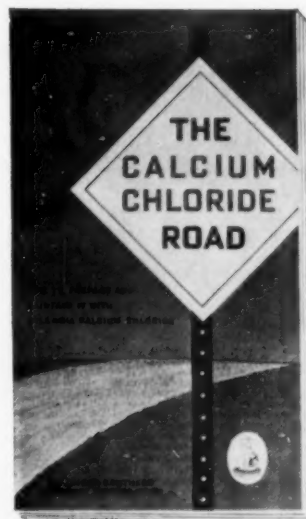
Spring rains supply the moisture necessary for the efficient blading and shaping work. Late Spring application of calcium chloride insures best year-round performance. Natural road moisture is preserved to eliminate the formation of dust dur-

ing the hot, dry summer months.

Spring conditioning of your unpaved roads pays big dividends throughout the year. Shape and crown your roads now, then treat with Columbia Calcium Chloride.

Order your supplies of Columbia Calcium Chloride today. Prompt delivery.

Address Calcium Chloride Dept. at our Pittsburgh address or any of the district offices.



**Write now for your copy of  
this new 28-page booklet!**

**COLUMBIA-SOUTHERN  
CHEMICAL CORPORATION**  
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY  
ONE GATEWAY CENTER • PITTSBURGH 22 • PENNSYLVANIA



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New York • St. Louis • Minneapolis  
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burgh • Philadelphia • San Francisco

IN CANADA: Standard Chemical  
Limited and its Commercial Chemicals  
Division.

... for more details circle 203, page 16

**ROADS AND STREETS, May, 1956**

# Bituminous ROADS AND STREETS



Surface heater operation in street maintenance program, City of Los Angeles. Adams grader pooling up heated material behind heater unit, preparatory to resurfacing street. (Roads and Streets photo.)

Published by Gillette Publishing Company  
22 West Maple Street, Chicago 10, Illinois

**Hard Surfaced Roads by Stage Construction**  
**Bituminous Soil Stabilization**

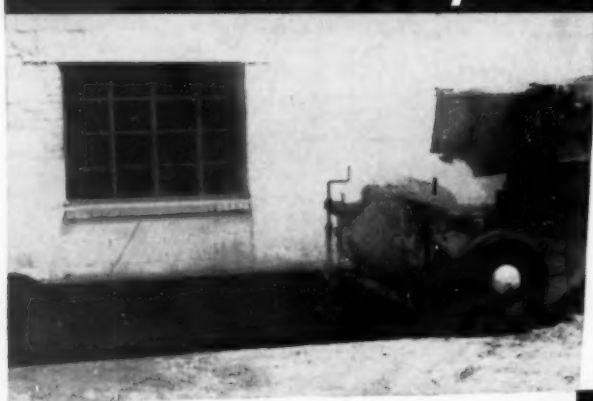
**MAY 1955**

# NEW LITTLEFORD TRUE-LAY PAVER-SPREADER...

**lays 100 tons of  
bituminous concrete  
per hour**



**...in driveways**



The 2-in-1 Littleford True-Lay tow type paver-spreader is designed for paving bituminous concrete in driveways, alleys and confined areas where heavy, cumbersome units won't fit. Operates efficiently and profitably in the wide open spaces, too. Cuts labor costs up to 65% and will quickly pay for itself. For complete information, send today for bulletin CG-32.

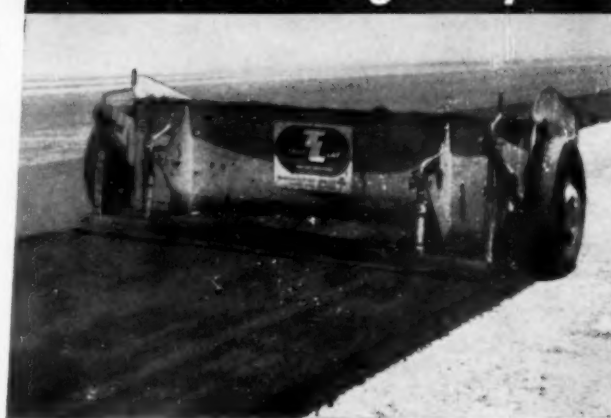
Littleford Bros., Inc., 454 E. Pearl St., Cincinnati 2, Ohio



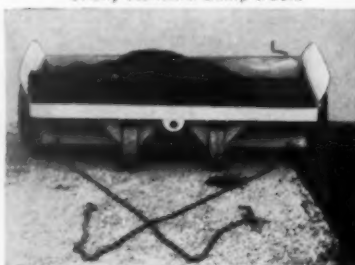
## Does more things better:

- ① Lays mat from 4-ft to 10-ft wide, up to 6" in depth
- ② Spreads 4" maximum size stone, too
- ③ Compaction equals up to 80% of mechanical tamper
- ④ Cuts labor costs 65%
- ⑤ Paves close to curb or buildings

**...or on highways**



Fastens to front bumper of any standard dump truck.



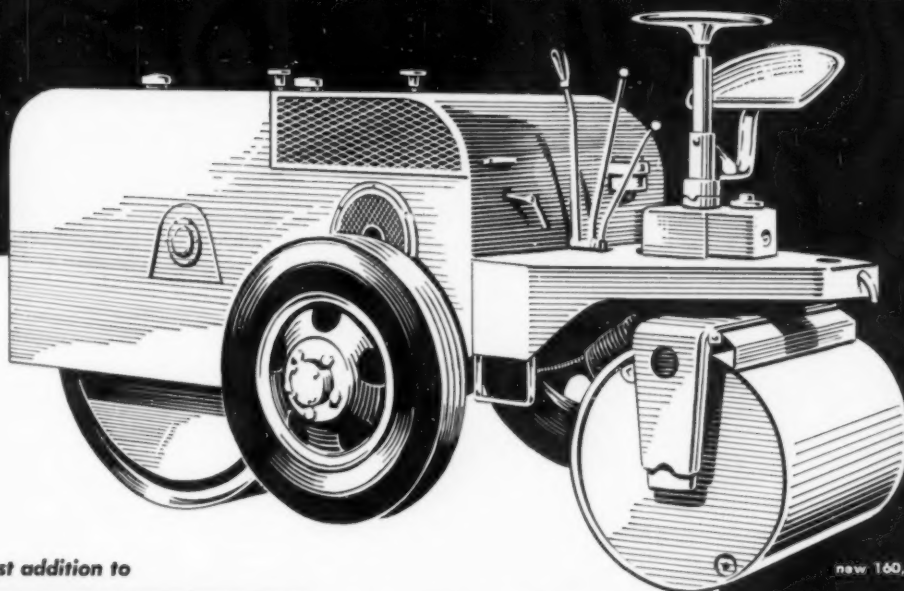
Wheel adjusted to ride on top of last pass



Carried on dump truck gate.



# NEW 3-5 TON ROLLER



latest addition to

new 160, bulletin 32

## LITTLEFORD

## portable roller line

Out of the Littleford engineering and development center has come the latest addition to the Littleford portable roller line—the new 3-5 ton Model 160 . . . featuring

- ★ **the first complete power steering** that brings pleasure-car steering ease to this 5-ton giant. No difficult steering lever to grapple with. Mechanical steering in reserve.
- ★ **hydraulic lift.** Change from trailing-to-rolling-to-trailing positions effortlessly, hydraulically, with a flip of a switch. Wheels need not be removed.
- ★ **rolling with trailing wheels in position** . . . wheels move up to high position of 5" above rolling surface. Can be removed easily and quickly if necessary.
- ★ **compaction** when ballasted of 173 lbs./lineal inch on main roll, 91 lbs./lineal inch on small roll.

★ **maximum stability** provided by the 48" diameter x 38" wide main roll and the 30" diameter x 36" wide small roll.

★ **ease of maintenance.** Clutch located outside for easy adjusting.

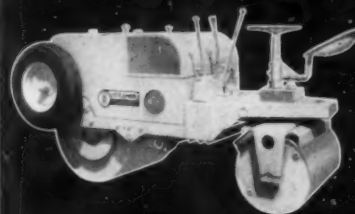
★ **19.5 hp air-cooled engine** delivers plenty of power when rolling up steep grades and thru soft base material.

★ **2 speeds forward and reverse.**

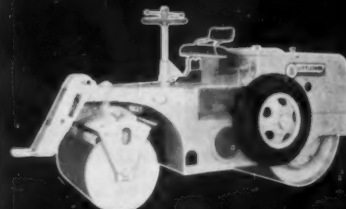
Now, with the introduction of the Model 160, there's a Littleford portable roller for every requirement. Send today for descriptive bulletins. Littleford Bros. Inc., dept. LB 215, 454 E. Pearl St., Cincinnati 2, Ohio.



world's most complete line of completely engineered black top equipment



Model 157, 2-3 tons, bulletin 24



Model 185, 4-6 tons, bulletin 20

### HYDRAULIC RAISING AND LOWERING



Unit in normal rolling position.



Hydraulic ram raises pulling tongue to engage towing truck pintle hook.



Pneumatic trailing wheels in trailing position with pulling tongue hitched to tow truck.

. . . for more details circle 272, page 16

ROADS AND STREETS, May, 1956



## He's riding on an **extra** cushion!

Asphalt's flexible quality acts as a "cushion" that helps reduce shock and vibration for drivers. And unlike rigid-type materials, roads constructed of asphalt require no expansion joints that cause annoying bumps.

Asphalt roads provide an extra margin of safety for drivers, too. The glare-free, non-reflective surface is less tiring on the eyes. And tests prove that asphaltic type roads make possible higher resistance to skidding when wet.

There are other important advantages that make asphalt the wisest choice for highway construction. These are:

1. Lower construction costs and lower maintenance cost.
2. Longer life.
3. Widening and strengthening is quicker, more economical and results are better.
4. Quicker to build . . . less interruption to normal traffic.
5. De-icing materials won't harm it.

For detailed information on the many advantages of asphalt, write The Sohio Petroleum Co., Asphalt Division, Midland Building, Cleveland, Ohio.

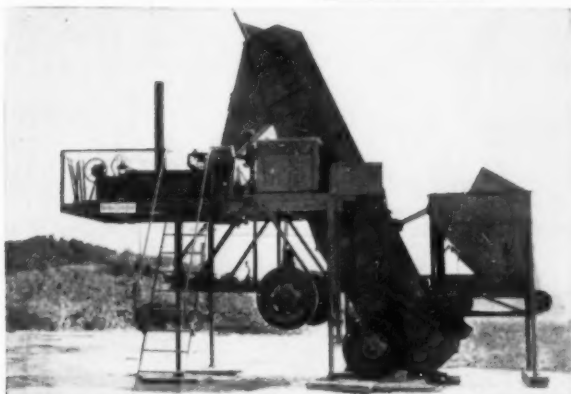
best for drivers,  
best for taxpayers,  
best for the future, too!



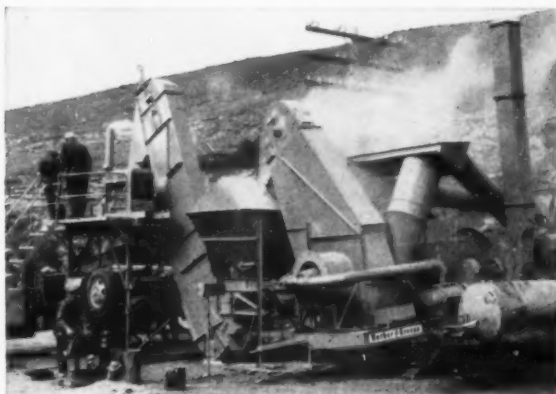
# ASPHALT

... for more details circle 254, page 16

# Start with an asphalt plant that can grow with your business



Begin with a mixer, elevator and hopper, and you're set to produce stabilized and cold bituminous mixes at capacities of more than 50 t.p.h. For a low initial investment, the Barber-Greene 840-B gives you big plant features and flexibility.



Later add a dryer to produce hot mixes (to 45 t.p.h.) suitable for nearly every type of paving job. With an aggregate feeder to control cold feed gradation, the complete range of hot mixes can be produced—except specs requiring screening after drying.



For high type mixes, expand operations with a gradation unit to produce mixes (to 45 t.p.h.) to meet any specification. A complete line of dust collectors, cold feeders, mineral feeders is available to meet all of your requirements.

Get big plant features with the low cost Model 840-B. A new, longer twin shaft pugmill, hydraulically operated pugmill discharge hopper, interlocked proportioning, speedy setup, unexcelled portability—all provide more production and profit.

56-5A

Now . . . check into this big money maker. Write for literature

## Barber-Greene

AURORA, ILLINOIS, U.S.A.



CONVEYORS...LOADERS...DITCHERS...ASPALT PAVING EQUIPMENT

... for more details circle 186, page 16

ROADS AND STREETS, May, 1956

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## **"Why Koppers fleet uses Etnyre..."**

The Etnyre shown above is priming a road near Alabama, New York with "Tarmac® RT-2." After covering with stone, it will be sealed with "Tarmac RT-8," covered with stone, and rolled. This work is being done by Koppers Company, Inc., of Pittsburgh, Pennsylvania, one of the large manufacturers of road tars in the nation. For the past twenty-five years Koppers has used Etnyre "Black-Toppers."

An Etnyre is one of the most modern pieces of equipment used on the road. The 3400-gallon Etnyre has low-pressure burners, keeping the material hot and ready for distribution on arrival at the job, effecting time saving of 60%.

Other features include the accuracy of applica-

tion; rapid changes in the rate of application; even coverage without "wet" or "dry" spots; instantaneous shutoff with the full circulating bar which prevents drippings of the material; and freedom from repairs.

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 BITUMINOUS DISTRIBUTORS



## VIEWS AND COMMENTS

By H. G. Nevitt

# Asphalt Volatility

**V**OLATILES in asphalt have been receiving special attention in the technical literature in the last few years, and now the specification writers are taking a hand. Some comments may be in order.

The basic premise is simple. Hardening of the binder is a frequent cause of pavement failures. Loss of volatiles from the asphalt binder results in hardening. Therefore the volatile content of the asphalt must be limited. Unfortunately the actual sequence of cause and effect, and the control of volatiles to prevent mats from failing for this reason at *minimum over-all cost* — we stress the italics — are not so simple as this sounds.

The first requirement in analyzing any problem is to accurately define it. The need here is to obtain a pavement which will not harden due to volatile loss in its probable useful life. This excessive hardening may occur in its period of use or in the course of constructing the mat. That is, we may have a pavement in which the binder is initially satisfactory but hardens excessively in time, or one in which the binder has hardened so much during the construction process that the pavement is initially unsatisfactory or will become so in a relatively short time. The conditions to which the asphalt is subjected and the factors influencing its hardening in these two periods (construction and use) are so different that they obviously must be considered separately.

In reality then we have two problems, which may be independent of each other. Certainly the controls should be set up independently. It is evident that no quality requirements can be met by the best possible material if the asphalt requirements (such as grade), or the construction procedure, is such as to result in an initially hard asphalt. It is equally obvious that the contractor should not be limited in his choice of asphalt, or the job cost be penalized by additional limitations or requirements,

merely to offset hardening that might occur after properly controlled construction.

Finally, the quality of the asphalt should be judged by its functional properties as a binder, and these should not be jeopardized or sacrificed to obtain ease in procurement or construction unless there are sufficient savings in cost to justify it — and this last situation does not in practice exist to our knowledge. We then must avoid these errors. They are not too easy to visualize or keep distinct in our further discussions, but this must be done to understand the problem and properly control the asphalt volatiles — and this includes correctly selecting the asphalt, and specifying it in the proper manner.

From the practical standpoint our volatiles control problem is separated into two phases. The first is the selection and specification of the asphalt, along with the construction methods, so as to provide a binder of the proper characteristics in the completed mat. The second is the further defining and specifying of the asphalt properties to make certain that the binder in this completed mat does not then unduly harden in the period for which the pavement is (or should be) designed. The variables involved and the needs from the standpoint of control in these two distinct problems will be later discussed.

It should be noted that the above comments apply equally well to cold or hot mix work, provided in considering the former we include in the construction period the curing time of the cutback, or the breaking and water elimination time of the emulsion, or the solution time of the pulverized asphalt in the flux as the case may be. It is interesting to note that with these cold mixes some effort has been made to independently control the changes which occur in the binder during construction, whereas we are aware of no hot mix specifications which distinguish between or attempt to separately control the changes which may occur in the construction and use phases. Since the immediate interest and need is for hot mix controls, our attention will be directed to this type of work for the present.

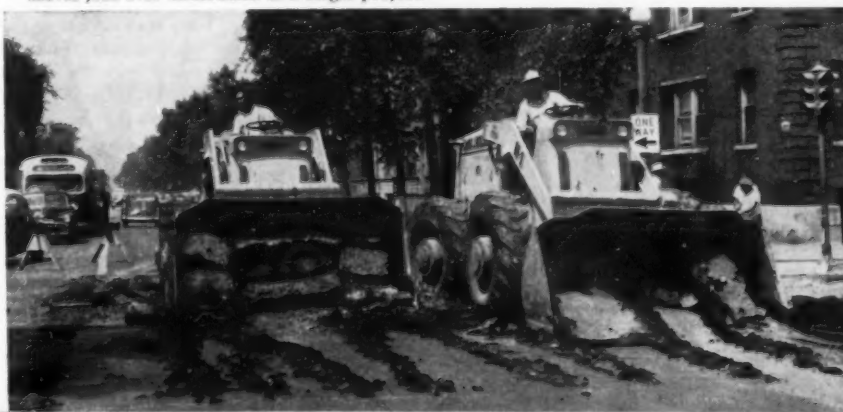
### How to rip up old asphalt quickly

Ripping up an extensive area of old asphalt pavement was part of a Chicago street job completed in 1955 by the C. J. Wilson Excavating Company of that city. Their work involved pavement removal on 8 lanes for a distance of  $3\frac{1}{2}$  miles along arterial 55th Street.

For this work, the contractor used a pair of Michigan 175-A tractor-shovels, equipped with special scarifying teeth. Wilson used two teeth attached beneath each bucket since the asphalt was a tough material consisting of an old well-compacted mixture of asphalt, limestone dust, stone up to 1 in., and concrete fragments running up to 3 or 4 in. in size.

One problem in taking up the old pavement was to avoid damaging the base to any appreciable extent. The C. J. Wilson firm came up with this method of removal, and took over this part of the job from the prime contractor, Union Contracting Company, which later put down the new asphaltic pavement.

- How a pair of tractor-shovels handled one of the biggest pavement removal jobs ever undertaken in a single project.



## HARD SURFACED ROADS BY

# Stage Construction

By Donald L. Schoeberlein

County Engineer, Humboldt County, Humboldt, Iowa

*Chlorides play an important role in the effective utilization of various combinations of soils and aggregates, as determined by these experiences, as related at the 1955 Iowa County Highway Conference.*

**H**UMBOLDT County, Iowa, lies in the third tier of counties south of the Minnesota line, and is almost equally distant between the Missouri and Mississippi Rivers. The county comprises only twelve Congressional townships (each 6 miles square). The topography is an almost perfect plain; the highest elevation within its limits rises not more than 30 to 40 ft. above the general level. However, the drainage generally runs from northwest to southeast. We have 250.9 miles of county primary (farm-to-market) and 433.5 miles of county secondary roads.

### Soils and Aggregates

The soils are of rich black loam averaging 2 feet in depth, attributed to the Wisconsin drift. This flat land confronts the county with a serious inability to drain water off the land. It is only through a system of open drainage ditches and tile lines that it is possible to successfully drain the land, and quite often during periods of heavy rainfall this drainage is not adequate.

Thanks to several gravel deposits within the county, all except 5 miles of county roads are surfaced with gravel, and every farm home outlets to a surfaced road. These 5 miles are of

little importance and very seldom used, so probably will never be improved. Also, in addition to the limited number of gravel pits, the county is blessed with a limestone deposit which covers the southwestern quarter of the county. The topsoil cover on this deposit varies from approximately 1 ft. to 30 or 40 ft. The Saint Louis limestone is on the upper ledge and the Kinderhook is the lower ledge. The stone is exceedingly hard, fine grained and of a pale drab or bluish gray color. The percentage of wear in the Los Angeles abrasion test runs around 30, and in the freeze and thaw test the percentage loss is below 2 percent.

In 1950, the board of supervisors decided to start a program of soil-aggregate stabilization. A 2-mile section which had just been resurfaced with about 600 cu. yd. per mile of gravel was tried first. Clay was added at the rate of 225 cu. yd. per mile. The old surface was scarified and the whole was mixed with a Wood pulverizer. The mixture was then windrowed to the side of the road. After the first rain, the windrow was laid down and compaction was left to traffic. Although the thickness of this treatment was probably not much more than 1½-in., the road held up during the

spring of 1951, when all of the other roads in the county were going to pieces. (Incidentally, this road was the county's most heavily traveled road carrying 350 vehicles per day). After observing this 2-mile section during that spring break-up, the board decided to do more of this type of work.

In formulating a program the 1948 traffic count was used in selecting the roads to be improved. Their relative location was also considered. At that time the policy of stabilizing all of the new farm-to-market grading projects, and some of the more heavily traveled local grading projects, was adopted. The county stabilized 10 miles in 1951, and in successive years 29.5, 35.75, 13.0 and 36 miles. Of the 1955 work, 14 miles consisted of reconstructing previous work.

At first only 1,000 cu. yd. of gravel per mile was used along with necessary clay binder. This was not enough surface metal and the roads soon wore through. The county is now using at least 2,400 tons of aggregate per mile and finds that the surfacing lasts much longer.

### Different Mixtures Used

Several different types of stabilizing mixtures have been used. They are chiefly gravel and clay alone; gravel, clay and calcium chloride; gravel, clay, Class "A" limestone and calcium chloride; and gravel, clay and No. 4 salt. For the light traffic roads of 100 vehicles per day or less the gravel and clay has proved quite satisfactory. For roads over 100 vehicles per day, calcium chloride or No. 4 salt has been added. When the traffic count is

*(Continued on page 162)*

Asphalt Products Company's Model S-80 Simplicity asphalt plant, the fifth Simplicity plant bought by Dick Shorts of Youngstown, Ohio.

Note: Simplicity vertical asphalt tank at left and Simplicity 10' air washer at right.

*Only*  
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**HAS:**

- Three compartment apron type feeder bin.
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- Hot or cold mix from one double shell dryer.
- Circulation of aggregates in dryer until temperature is right. No low temperature materials put into bins.

- Renewable liner plates in dryer, breeching and dust collector.
- Furnace large enough to burn oil or gas efficiently. No unburned fuel wasted on aggregates.
- Dust collector located high above dryer—minimizing load in collection system.
- Simplicity air washer—used on every make of asphalt plant in the country.
- Double-zone mixer. Fast mixing, less wear and power.
- Tubular columns with erection hoists. Faster—easier erection.

See a Simplicity Plant in operation — talk to the Simplicity owners and operators.

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FROM BUILDER TO BUYER  
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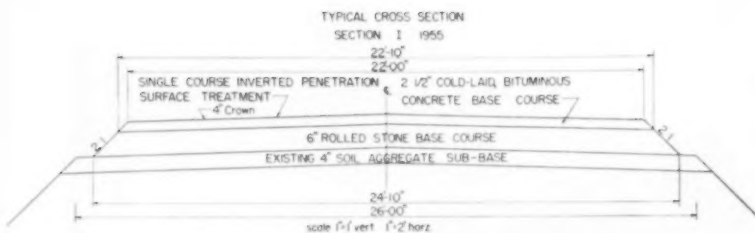
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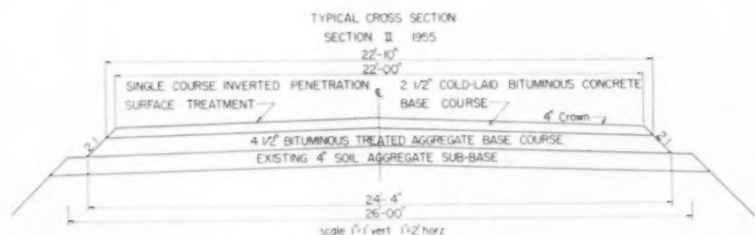
CHATTANOOGA 6, TENNESSEE

... for more details circle 250, page 16

ROADS AND STREETS, May, 1956



● Cross-section of 1955 Section 1 embodying clay-gravel stabilized base.



● Typical cross-section of bituminous concrete road, 1955 Section 2.

## Stage Construction

(Continued from page 160)

above 200 a surface application of calcium chloride on the base has also been used.

Of the foregoing mixtures, it was found that the combination of gravel, Class "A" limestone, clay and calcium chloride has held up the best. However in 1954, the county started to use No. 4 salt and in 1955, used considerably more. For a comparison with chloride, only time will tell.

Construction procedure for the soil-aggregate stabilized base consists of contracting for the aggregate in place on the road. The county then follows up by force account, hauls the clay binder, and processes the mixture. This also includes the addition of the chemical in the mixture and the surface applications of chloride.

At present two methods for applying the surface treatment of calcium chloride are employed. They are (1) dry application with mechanical spreaders and (2) by solution. Due to the price range between sack chloride and bulk, the county now uses bulk almost entirely. Upon receiving a shipment, if there is sufficient moisture on the base the flake chloride is used, but if the base is very dry, the chloride is applied in solution by using a 1,000 gal. spray truck. The cost of applying a 40-ton car of chloride in solution is around \$150; two men can apply it in three days.

Listed below is the cost of a 3-mile project built in 1954:

7,802 tons of gravel in place  
(7.35 miles average haul) \$5,293.58

|                              |          |
|------------------------------|----------|
| 3,172 cu. yd. clay (royalty) | 317.20   |
| 40 tons No. 4 salt           | 540.00   |
| 12 tons anhydrous chloride   | 455.28   |
| Hauling of clay (7.5 mile)   | 1,244.46 |
| Labor                        | 660.36   |
| Equipment rentals            | 899.50   |

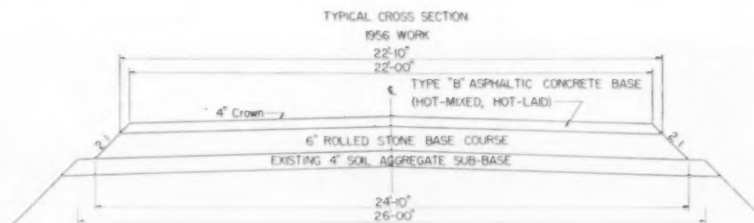
Total cost \$9,410.50  
Average cost per mile \$3,136.83

Stabilization work is roughly estimated at \$3,000 per mile, including a 4.0-ton-per-mile surface application of chloride.

## Getting Proper Moisture

With proper moisture the road proves much easier to maintain, requiring considerably less blading. The absence of dust is a factor which the traveling public and the adjacent residents like very much. Truckers state that in driving over these roads they notice less pull of their loads as compared to an ordinary road.

During dry periods, however, a considerable amount of raveling and loss of clay binder occurs. During the extreme dry periods when the relative humidity is low, even the application of chloride in solution failed to keep the bases from raveling.



● Typical cross-section of proposed 1956 work.

## Bituminous Surfacing Program

In 1953, the county considered the problem as to what roads to surface with bituminous materials and in what order they should be taken. The board felt that a new traffic survey should be conducted; the last was in 1948. Again this was to be used as a basis for selecting the roads to be improved. It was also decided to concentrate on getting each town on a hard surfaced road first, and then select the roads according to the traffic they bear.

In 1954, two portable traffic counters were purchased and for a period of 6 months traffic counts at 220 different locations were taken. In addition to this the Iowa highway commission conducted counts at 60 locations and from the collected information it was possible to construct a new up-to-date traffic flow map.

Then a program of 5.9 miles of high-type surfacing was submitted to the highway commission for approval. This surfacing had a finished top of 22 ft. and was divided into sections of 2.8 miles and 3.1 miles. Each had been built initially as farm-to-market projects in 1946, and in 1952 received a gravel-clay stabilized base.

Due to the fact that each section involved a different type of subbase, the two will be discussed separately.

● **Section One.** Section 1 due to nearness of rock quarry, was given a 6-in. rolled-stone base with a 2½-in. cold-laid asphaltic concrete mat containing 4½ percent asphalt. It was finished off with a seal coat, using limestone chips for cover aggregate. Tests indicated that for a 2½-in. asphaltic concrete the gravel from a pit approximately 5 miles south would pass with no blending of materials needed.

On each of these projects the county furnished all aggregates stockpiled at a central location. In November, 1954, a contract was let for stockpiled stone and in February for the gravel stockpiles. The contract for the bituminous work was let March 31, 1955, with May 9 starting date and September 3 completion date.

On each project the contractor could use either MC-4 asphalt or SS-1 emulsion, and either a road-mix

or a central plant mix. The successful bidder on both projects chose to use a central plant mix and used SS-1 emulsion. He also used 225-300 penetration AC for the seal coat.

The contract prices for Section 1 were as follows:

|                               |             |
|-------------------------------|-------------|
| Furnish rolled stone material |             |
| in stockpile                  | \$21,025.00 |
| Furnish gravel in stockpile   | 2,390.86    |
| Furnish cover aggregate       |             |
| in stockpile                  | 1,039.38    |
| Contract for stone base       |             |
| and blacktop                  | 37,569.23   |
| Total                         | \$62,064.44 |
| Average per mile              | \$22,165.87 |

● **Section Two.** On section 2 it was decided to construct, on the existing stabilized road a 4½-in. bituminous treated aggregate subbase and a 2½-in. asphaltic concrete base, with a seal coat and limestone chips for cover aggregate. In the subbase 2½ percent of asphalt was used. Due to the high shale content of the local gravel aggregate (about 12%), it was decided to blend gravel and limestone. This was done on a basis of 60% gravel and 40% limestone.

The contract prices for section 2 were as follows:

|                             |             |
|-----------------------------|-------------|
| Furnish gravel in stockpile | \$ 7,106.50 |
| Furnish limestone           |             |
| in stockpile                | 11,789.50   |
| Furnish limestone chips     |             |
| in stockpile                | 1,585.40    |
| Contractor for bituminous   |             |
| subbase and base            | 47,567.97   |
| Total                       | \$68,049.12 |
| Average cost per mile       | \$21,951.33 |

Of the cost listed above the cost of the stabilized base which was previously placed, has not been included.

In constructing the bituminous treated aggregate subbase, considerably more difficulty was encountered in getting densities than was encountered on the rolled stone base.

On section I & II of the 1955 work the bitumen content for the 2½ in. cold-laid, bituminous concrete base course was 4½ percent. On Section II, the bitumen content for the 4½ in. bituminous treated aggregate base course was 2½ percent. For our 1956 work the basic bitumen content for the Type "B" asphaltic concrete base is to be 5½ percent.

● **1956 Plans.** For 1956, a 10-mile project is to be let calling for 6-in. rolled stone subbase. The basic bitumen content for the asphaltic concrete will be 5½ which, it is expected, will allow the county to forego a seal coat for several years. This will be constructed upon the existing stabilized base. The contract price for the stone is \$0.94 per ton.

## Lightweight Airborne Crane Developed



● Airborne crane developed by the Corps of Engineers' Research and Development Labs at Fort Belvoir, Va., and the Wayne Crane Co., lifts 16,000-lb. tractor. Crane, which can be dropped to units in forward areas, weighs only 14,700 lb.

## Clarifying statement on soil waterproofing chemical

A recent press release from Indiana State Officials has been criticized by scientists of Iowa State College.

The Indiana release concerns the use of a chemical, dioctadecyl dimethyl ammonium chloride, abbreviated to DDAC by one user, to waterproof soils for roadbeds. The chemical was supposedly made from corn and if successful could go a long way towards relieving the Midwest's surplus corn problem. But according to Dr. D. T. Davidson, Professor of Civil Engineering, Iowa State College, "The so-called DDAC is certainly a soil stabilizer, and it may be the answer to our secondary road problems. But Armour & Co., who make the chemical, say it is not made from corn."

"It is a by-product of the meat packing industry and goes by the trade name of Arquad. Similar products which are being tried with soils are made from soybeans and from coconut oil."

As for the use of Arquad as a soil stabilizer, Davidson states that it shows great promise as a waterproofing, but it does not harden the soil, and it has not been widely tried yet. Arquad does seem to keep soil from

turning into mud when wet. Davidson and his associates at the Iowa State College Engineering Experiment Station have been testing this and similar chemicals for over eight years. Use of Arquad with soils was reported at the Highway Research Board meeting in January, 1955, by J. M. Hoover of the Iowa Engineering Experiment Station.

A large research program sponsored by the Iowa state highway commission has shown that Arquad is only one of several chemicals which have promise for soil stabilization. But further laboratory and field testing are considered necessary to show which of the treatments is most satisfactory for roads.

"One chemical we might mention, because it's made from corn, is furfural," states Davidson. "Furfural mixed with another chemical makes a plastic which hardens soil. If successful, this could have commercial application. So far as I know no one else is working with furfural in soils at the present time." Furfural experimentation is being carried on by J. B. Sheeler of the Iowa Engineering Experiment Station.

Davidson is the co-author of a forthcoming book on soil stabilization.

Why bituminous soil stabilization, after many years of effort and a good start in the 1930's, has not made better progress is outlined in this article, written exclusively for **ROADS AND STREETS**. Mr. Benson re-emphasizes the need for wider use of bituminous stabilization to conserve dwindling aggregates and render a better public service. The problem shared by refiners as well as highway department materials and research engineers, is to make proper grades of asphaltic materials more widely available and to develop quality control tests applicable to these materials and to the stabilization process. — The Editors.

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● Dune sand stabilization — cementation type stabilization Colorado state highway 52, Hudson, Colorado, 1952, 6 in. stabilization using MC-4, single surface treatment Barber-Greene plant. (Colorado State Highway Department Photo.)

● Road mix project on U. S. 154 in western Kansas. Typical of processing methods used in the Kansas soil-bituminous stabilization in recent years. Photo courtesy San Ore Construction Co.



# Bituminous Soil Stabilization

By **Jewell R. Benson**

Consulting Bituminous Engineer, Denver, Colorado

THE recent editorial comment on soil stabilization by Mr. H. G. Nevitt in *Bituminous Roads and Streets*, brings to the fore the question: What has happened to bituminous soil stabilization? After a good start some 15 years ago, bituminous soil stabilization now approaches a lost art and as a type of construction today, it is a relatively minor one. One might ask, is there no need for this type of construction? This obviously is not true because today, as never before, we need adequate and low-cost bases for our highways; and even more important, we need conservation of our natural resources of aggregate materials, presently being so extravagantly used in base course construction. These aggregate materials will probably be much more critically needed in years to come for the construction of wearing surfaces proper.

Unless better use of existing soils for base construction is soon made, it will be necessary, in many parts of the country, to ship aggregates hundreds of miles. In some sections, this condition now exists. There is, therefore, an urgent need for more and better use of soil stabilization, and particularly, because of its efficiency and versatility, bituminous soil stabilization.

Why, then, has this type of stabilization been so neglected? The factors causing this condition are many. Among them may be cited the following:

1. A multiplicity of design procedures, frequently presenting conflicting or divergent ideas, making it very difficult for the materials engineer to select a reasonable and conservative laboratory design procedure without undue responsibility on his part.

2. The lack of exacting criteria relative to the "strength" and water-resistance necessary for successful performance of the stabilized soil in the highway.

3. A lack of understanding relative to the importance of the role of the asphaltic material itself in certain types of stabilization.

4. A lack of courage on the part of the average highway engineer to plunge into new and difficult fields when conventional methods are at hand.

It should be noted that none of the factors noted include the impossibility or even impracticability of actually accomplishing a bituminous stabilization of soils. This is not considered to be a factor because essentially any and all types of soils may be successfully stabilized with asphalt, if use is made of all the different types of bituminous soil stabilization available today. The truth of these statements will be borne out in subsequent paragraphs of this article.

## Design and Construction

Some types of bituminous soil stabilization are absurdly simple. Others are very complex, at least with respect to their exact technical nature, although for all practical purposes they need not be. The actual design and construction of bituminous soil stabilization can be made quite simple and effective, without recourse to extreme technical considerations. However, it is very important that the basic technical background be understood, that good engineering judgment might then be applied to simplification of the design and use processes. Since the stakes are so high in the

use of this type of construction, it should be well worthwhile devoting a small amount of time in a discussion of these factors. We may well start with a classification of the two principal types of bituminous soil stabilization, which are given in Table I.

A cementation type of soil stabilization is the "simple" type. It is so because we follow very closely the mandates of surface pavement construction, with proper allowance for the lower stresses that exist in base courses. In the cementation type of stabilizations, we utilize aggregate or near-aggregate "soils," which may be pit-run materials having aggregate or appreciable size, fine sands such as blow-sands or beach sands, or even well-graded mixtures of aggregates and soil, as in aggregate-binder soil mixtures, in which the asphalt gives to the mixture greatly added strength. So-called "black bases" are a cementation type of stabilization in which the aggregate materials are very similar in type and grading to those used in the surface course. In these forms of stabilization, the "kind" (as distinguished from type and grade) of asphaltic material used is not too critical, and the asphalt used is usually similar, with respect to basic refining method, to the asphalt used in the surface courses.

**TABLE I**  
**Primary Types of Bituminous Soil Stabilization**

1. Cementation type.
2. Waterproofing type.

TABLE II

## Water-Proofing Types of Bituminous Stabilization

1. Intimate mixtures of soil and asphalt, in which, essentially, each soil particle is surrounded by a protective film of asphalt.
2. Waterproofed mechanical stabilization in which capillaries in mixtures of aggregate and soil are effectively "plugged" by asphalt particles.
3. Phase-mixed stabilization in which nodules or aggregations of plastic soil are encased in a thick protective film of asphalt.
4. Membrane enveloping, in which large soil masses, as an entire fill section or a placed base, is wrapped up in a protective membrane to prevent loss or gain of moisture.

The waterproofing type of soil stabilization is quite a different matter. Here, as a rule, we are dealing with soils (either as a whole or as a portion of a total material) which have very low degrees of stability when wet, and one basic premise of stabilization is that all natural forces tend towards this wetting. If excessive wetting of the weak soil can be prevented, most materials will retain, after construction, satisfactory degrees of strength, permitting their use as base materials. The relative strength of wet and "dry" clays (even "dry" clays contain an appreciable water content) is an interesting example of this condition. To better explore the various methods of stabilizing soils by increasing their water resistance, the following classifications may be made, see Table II.

## Bituminous Types

Each of these types of stabilization has a positive and valuable place in highway construction. Because of the widely different types of stabilization represented, a practical method is made available for the stabilization of practically any and all types of soil, recognizing the fact that the elemental shear strengths of some soils might necessarily need supplementing by admixtures of other soils (peat, for instance). However, to use any of these types of stabilization with any degree of confidence and security, requires a comprehension and understanding of the principles and materials involved. Once these basic principles are understood, it should not be necessary that all subsequent work proceed at extreme technical levels but rather, relatively simple tests should provide the necessary information for successful application of these principles. While it may be necessary to have a very high degree of technical skill to determine the exact chemical constituents of an over-age egg, it is equally obvious that a PhD in chemistry is not necessary to determine without a doubt that the egg is rotten. Some of the same homely philosophy may be applied to bituminous soil sta-

bilization. Let us examine in more detail the waterproofing types of bituminous soil stabilization.

Of all types of bituminous waterproofing type soil stabilization, the most common is that of the intimate soil-asphalt mixture (1, 2 and 8), utilizing usually soils of a general silt classification. In lieu of a "silt" classification, one might designate "friable" soils, or those capable of being pulverized by conventional equipment, to permit an intimate mixture of asphalt. In general, these soil types have Plasticity Indices of less than 10 or 12 (permitting pulverization). While this type of soil stabilization is one of major importance due to the fact that such soils are common and the basic construction procedures simple, little use is made of the type because of intricate design considerations.

One of the design factors is that of the method of test to be used, and the criteria of strength and water-resistance necessary for satisfactory performance in the highway. Discussion of these factors will be postponed, for the moment for a later paragraph. A second factor, and one that has equal if not actually greater importance, is the matter of the character of the asphaltic material used for this purpose. In the writer's opinion, the latency, if not demise, of the intimate-mix type of soil stabilization has been due far more to the limitation of the types of asphalt materials available for this purpose today, than perhaps

to any other factor. Paradoxically, the waterproofing type of bituminous soil stabilization has been caught in the back-wash of improved methods of refining asphalt — to the extent that the kinds of asphaltic materials best suited for this type of stabilization are, in general, no longer available in sufficient quantity to support large programs of soil stabilization. Ironically, through this factor, it is the asphalt industry itself which has contributed most to the present low status of bituminous soil stabilization.

However, if the industry would recognize the importance of certain kinds of asphalt, and if the highway engineer would, in turn, lend even a modicum of support towards the intelligent use of proper materials, bituminous stabilization could occupy a station of high importance in the highway construction field.

Why is the "kind" of asphalt to be used for waterproofing type bituminous soil stabilization so important?

## Testing Asphaltsoil Mixtures

Quite percursor tests on asphalt-soil mixtures — using a variety of asphalts and assuming a choice of asphalt viscosity and type which will permit intimate mixing, and a soil intermediate between sand and clay ("silt" is still a good term) — will reveal that some mixtures of soil and asphalt will actually disintegrate faster in water, than the raw, untreated soil. Other mixtures (if you obtained a "good" stabilizing asphalt) will give very high degrees of immunity to water action. Unfortunately, the kinds of asphalt being produced today, while of a most excellent quality for the pavement surface proper, are generally poor for this type of stabilization. This is one reason for the extreme difficulty experienced today by many highway engineers attempting to develop intimate mix types of bituminous stabilization.

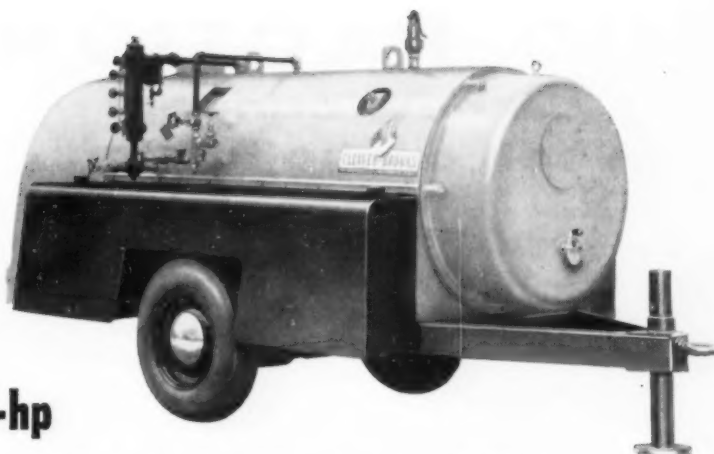
(Continued on page 168)

TABLE III

## Classification of Currently Available Materials

| Class I  | Class III  |
|--|--|
| 1. Steam refined.                                    | 1. Residue from the cracking of gas oil.                       |
| 2. Vacuum refined.                                   | 2. Blends of gas oil residue and Class I or Class II asphalts. |
|  | 3. Class I asphalt over-heated to produce positive spot.       |
| Class II   | Class IV   |
| 1. Solvent extracted, refluxed from soft base.       | 1. Air-blown asphalts.   |
| 2. Solvent extracted, refluxed from hard base.       | 2. Catalytically blown asphalts.                               |
| 3. Blends of solvent extracted and Class I asphalts. |  |

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**Cleaver-Brooks 50-hp**

## PS-50 PORTABLE STEAMER

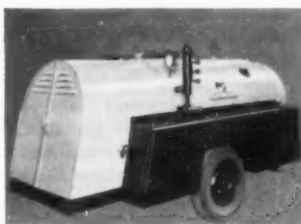
**twice the steam and work capacity!**

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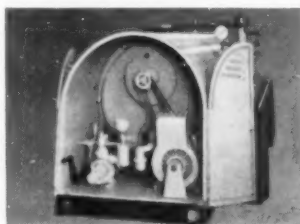
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Surveys among contractors, municipalities, state and county highway departments prove the need for the new PS-50. They show this extra capacity is essential to economically handle scores of extra jobs constantly added to yearly work schedules.

The PS-50 PORTABLE STEAMER is the huskiest ever offered in its price range. It has the same high-quality design advantages of America's most modern boilers: quick steaming from a cold start . . . delivers 1725 lbs. of dry steam per hour . . . has proved economy of famous four-pass, forced-draft construction. Fully equipped — ready to GO!



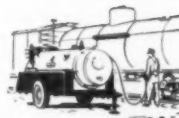
**TOWS ANYWHERE WHEELS CAN ROLL** — Fender tanks carry 45 gals. water, 45 gals. fuel-oil, 8 gals. gasoline. Completely insulated, weatherproof. Attractively painted black and orange. Size: 13'-0" long, 5'-3½" wide, 6'-0" high overall.



**FRONT END OPENS WIDE** — More room for components. Greater ventilation means cooler running engine . . . more operating convenience. Removal of 6 bolts opens rear head for fast cleaning. ASME code constructed.

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**Cleaver Brooks**



TWENTY-FIVE YEARS OF LEADERSHIP BY THE ORIGINATORS OF THE SELF-CONTAINED BOILER  
... for more details circle 200, page 16

ROADS AND STREETS, May, 1956

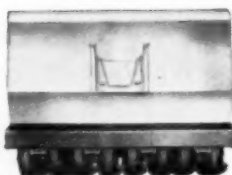
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Only the new Seaman-Gunnison DUO-PACTOR provides the advantages of "DUO-PACTION", incorporating pneumatic and steel rolls in one unit.

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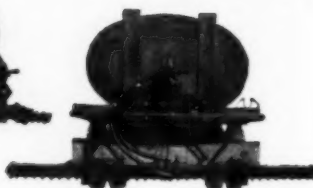
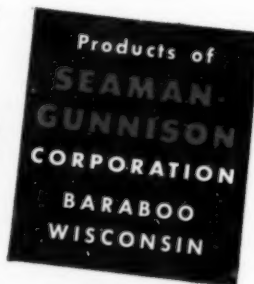


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## Soil Stabilization

(Continued from page 166)

The basic reason behind this situation is two-fold: (1) the successful stabilization of intimate-mix, waterproofing type soil stabilization is far more critical of certain characteristics and properties of asphaltic materials than any other use of asphalt; and (2) all efforts of engineers and chemists alike for the past 20 years have been to improve asphalts in weathering and aging resistance, which improvement has generally been in a direction counter-current to the properties most important to this type of stabilization.

At the risk of becoming pedantic, let us look at the asphaltic materials being offered the highway engineer today. We here ignore asphalt as denoted by type (SC, MC, RC, AC, Emulsion, etc.), and grade (1, 2, 3, etc.) as choices of these elements are obvious. A classification of asphaltic materials currently being produced, may be given as follows in Table III: See page 166.

## Varied Asphaltic Materials

Each of these materials, with the exception of the two Class I asphalts, represent a different asphaltic material, different in many characteristics and properties, most of which are not measured in any conventional "standard" test on asphalt. In recent years, a very stable asphalt industry has been built up around the Class I asphaltic materials. These materials generally give excellent service in all types of highway pavement surfaces, whether in cutback, emulsion or asphalt cement form. They have excellent weathering and aging resistance, particularly in high degrees of exposure. However, as a class they are frequently quite unsuitable for waterproofing type bituminous soil stabilization, even when heavily "doped" with strip-retarding agents (some exceptions exist, as this character will vary with the source of the crude, methods of refining and the soil).

In recent years, Class II asphaltic materials have appeared in ever-increasing volume due to certain advantages in refining, and also, to the improvement of some properties as indicated by some conventional standard test methods. Since steam and vacuum processes are used in stripping the partial solvent, most producers classify these materials as steam or vacuum asphalts, although actually they may differ quite radi-

cally from true Class I asphalts. Most of these variations are not indicated by standard tests. It might be assumed, in the absence of more definite information, that this class of materials will be intermediate between the Class I and the Class III materials in their behavior with respect to all uses in pavement construction. For waterproof soil stabilization, the Class II materials should exhibit somewhat improved properties over the Class I materials, though probably not approaching the efficiency of certain asphalts in the Class III materials.

Class III materials are generally much superior to any other materials for waterproof type stabilization although here again, many variations may exist. Straight cracked residues (No. 1 of Class III) or blends of cracked residue and Class I or Class II asphalts usually exhibit the maximum efficiency for this purpose. If proper care is taken in refining, excellent materials for this purpose can be produced. Materials Nos. 3 and 4 of Class III will usually act similar to Class I materials in their stabilizing action, and may be very poor for this purpose. It should be noted here that the mere requirement of a positive Oliensis spot, or for that matter, any other "standard" test requirement, is not adequate for the control of the essential character of an asphalt to be used for this type of stabilization. This control must be obtained through laboratory tests on actual mixtures simulating the mixtures to be obtained in the field, and subject to an established water-exposure procedure. The weathering resistance characteristics of most Class III asphalts are poor.

However, in utilizing these materials in base courses, the water-resisting properties of these materials are used to a maximum, while the protection from the elements accorded by the base use greatly decreases the importance of weathering resistance and excellent service in stabilization is usually obtained.

#### **Catalytically Blown Asphalt**

Class IV materials are seldom if ever used in actual mixtures of soil or aggregate. However, the catalytically blown asphalt (No. 2) made with a phosphorous pentoxide catalyst (under no conditions, with ferric chloride) provides a most unusual asphalt for use as a membrane envelope for enclosure of soil masses as a moisture-control means.

#### **Study Adhesion Properties**

The purpose of the foregoing has been to give to the reader some of the background surrounding the importance of the kind of asphaltic material to be used for stabilization, and to point out the extreme errors which might be made if proper consideration is not given this factor. When attempts are made to stabilize soils with asphalt in a waterproofing type of stabilization, and poor water resistance is obtained, it does not necessarily hold that such stabilization is impractical or impossible or that the soil is such that it cannot be stabilized with asphalt. Rather, the asphaltic material used should first be checked very carefully to determine if the basic adhesion properties necessary for adequate stabilization exists in that asphalt. This factor, by far, is most important under current conditions. A very worthwhile service could be performed by some organization who would make available to the public a reference asphalt having these properties, that this variable would not affect design considerations.

Is it necessary that the materials engineer know definitely the classifications, source, type, method of refining and all the other technical aspects of an asphalt to be used for successful soil stabilization? The answer is no. It would be a help, but the proof of the pudding is in the eating, and for practical design, it should be necessary only for the engineer to have access to several asphalts, including, if possible, a number of materials of Class III type. These asphalts (as many as five or ten would not be amiss) may then be mixed with the soil to be stabilized, and the water resistance measured by some means, that comparative values could be established. It should be noted here that once a design has been determined, and the water resistance-strength values obtainable with a given soil and the most efficient asphalt ascertained, extreme care must be exercised that an equally effective asphalt be used in actual construction. Since the desired characteristics of asphalt cannot be covered by conventional tests, a laboratory "performance" test should be required for all asphalt to be used for this purpose. In addition, check tests of this type should be performed at frequent intervals during construction. The means for determining this water resistance, and the strength-waterproofing criteria necessary for actual design is again deferred to a later portion of this article.

Let us refer back now to our other types of waterproofing type soil stabilization. We have discussed the intimate mixture types of stabilization, and the extreme importance of the type of asphalt used. Waterproofed mechanical stabilization (3) is a most valuable and again, seldom used, variation of stabilization. This type is of importance where some deficiencies of the finely graded portion of an aggregate-binder soil blend exists. This deficiency may be excessive sensitivity of the mix to the action of water (swell) or to frost action (capillarity). In many cases, these actions may exist in well-graded aggregate-binder soil stabilized base mixtures.

#### **Fine-Grained Materials**

To control these reactions, it has been prevailing practice during the past decade to eliminate, frequently at great cost, the offending fine-grained materials to obtain low-capillarity constructions. In many cases, equally satisfactory results could have been obtained with waterproofing of the mixture with asphalt, at infinitely less cost and probably better performance. It is well known that the addition of quite small quantities of asphalt, usually in the form of an MC-2 or an MC-3, often affects a highly efficient "plugging" action in such compacted mixes, greatly reducing or eliminating the danger of water or frost action. Some authorities in this field have held that extremely careful grading of the aggregate-binder soil mixture is an absolute necessity in order to obtain the desired reduction of capillary action, but the writer does not believe this to be true. It is more probable that any aggregate-soil mixture would be improved with respect to capillarity, if the proper quantity, type and kind of asphalt were added.

The quantities of asphalt added must not exceed that required for the plugging action, or lubrication of the mixture with subsequent reduction of shear strength may occur. The quantities of asphalt (usually of MC type) required are quite low. In some instances, from 0.5% to 1.5% MC cutback will effect a radical improvement.

The kind of asphalt used is not as critical as in the case of intimate mixtures, but in general, a Class III asphalt would probably be superior. Again, laboratory immersion tests on the asphalt-soil mixture must be used to determine asphalt type and proportions as the critical property of the asphalt is not measurable by conventional means.

### Phase-Mixing

Phase-mixing of soil and asphalt (4 and 5) has had several successful applications, and is particularly adapted for use with soils of higher plasticity. A requisite for this type of stabilization is a "balling" consistency of the soil. When soils of such type are used (in the range of from about 10 to 25 P.I., and either in entirety, or constituting a controlling portion of the mixture), water is added to the soil and worked in by suitable means, preferably some 10 to 24 hours prior to mixing with asphalt. When the proper balling characteristics are obtained, (sometimes called the "fluff point"), the soil is mixed with about 5% MC asphalt, usually in a road-mix single pugmill type machine. In the mixing process, nodules of soil are coated with a film of asphalt of much less quantity than the amount of asphalt required for an intimate mix, and giving a mixture that can be handled and compacted easily. The film of asphalt prevents additional water from entering the nodule, the damp soil within the nodule compacts to high density and strength, and a very satisfactory degree of stabilization may be obtained.

The secret of phase-mixing stabilization is in adequate moisture control in the soil (broad limits at low P.I., but increasingly narrow as the P.I. goes above about 20), and in a close observation of the mix as it leaves the mixer. A simple control is that the mix must appear to the eye as being completely asphalt-coated. If uncoated raw soil is visible, the mixing is probably excessive, so that the "phasing" of the soil and asphalt is incorrect (i.e.: the correct phase would be for the asphalt to be continuous, and soil discontinuous).

An interesting characteristic of this method, in addition to the fact that plastic soils may be stabilized, is that a *minimum* amount of mixing is required. The type of asphalt is critical, (Class III), and should be carefully ascertained by laboratory tests prior to setting up the project and by suitable check tests during construction. The asphalt used in actual construction must equal or exceed the asphalt used in the laboratory design with respect to functioning as a waterproofing substance. Great care must be used to prevent over-mixing, which results in an intimate-mix type of stabilization. When a stabilized mixture designed for phase-mixing becomes over-mixed, the quantity of asphalt added, while adequate for phase-mixing, is much less than that required

for intimate mixing, with the result that the mix will be excessively lean and may even be friable to the extent that it will not function as an under-surface for the pavement proper.

Mixes designed as phase-mixed in the laboratory, must mandatorily be constructed as phase-mixed in the field. These are simple observations, yet it is the writer's experience that the major difficulties in attempting to use phase-mixed stabilizations to date have been exactly these.

While this method has many advantages, particularly in the low-cost stabilization of the more plastic soils, most highway engineers have been reluctant to use the method because of lack of understanding of the principles involved and probably, an unreasoning terror of the idea, in this day and age, of a mixture being controlled almost entirely by "eye." (This makes phase-mixing more of an art than a science.) However, rich rewards await the engineer with sufficient intestinal investiture to overcome these qualms, and to plunge into the practical application of this, as well as the other methods of stabilization which are being discussed.

### Membrane Envelope

Our fourth type of waterproofing type stabilization asphalt membrane enveloping, has likewise been proven in service (6 and 7). This method consists of enveloping a mass of soil by means of a thick membrane of asphaltic material to prevent, usually, either loss or gain of moisture. In practice, as in a fill, a membrane of asphalt would be applied by spraying the hot asphalt on a smoothed subgrade, the membrane normally being about 1/4 in. to 5/16 in. thick (1.5 to 1.75 GSY), care being taken to avoid holidays and voids. The base would then be constructed over this bottom membrane, using such soils as may be available, which may include quite cohesive, high P.I. materials. After the first 6-in. layer of soil is placed over the membrane, compaction proceeds according to conventional means. When complete, an asphalt membrane is placed on the side slopes, joining the bottom membrane in a water-tight joint, and extending either over the top, or in a suitable juncture with surface course or cushion course. The exposed membranes on the side slopes are then covered with from 12 to 36 in. depth of soil.

Many variations of the construction are possible, one of these being the use of such membranes as highly ef-

ficient cut-offs for capillary action involving the rise of water into either subgrade or base courses from lower elevation sources. This method permits the utilization of practically any type of compactible soil, and affords protection against both swell (water intake) and shrinkage (water loss), as well as providing stabilization for load-carrying capacity. While ordinary paving grades of asphalt cement have been used for this purpose, the use of a catalytically blown asphalt of 50-60 penetration and 175-200°F. softening point (Class IV, No. 2) is recommended for increased toughness (to withstand soil placing and compaction), freedom from holidays and better aging resistance.

Again, although the method is simple and the cost quite low, with the additional advantage of maximum soil utilization, highway engineers have been reluctant to use the method, preferring to stick to what is regarded as the more "fool-proof" conventional means of construction. However, the method is there, ready for use, with an already excellent record of performance.

The consistent increase in methods of utilizing asphalt for the stabilization of soils for highway use indicates that there are probably many more methods that are possible, and are lying in wait for the investigator, or perhaps even more importantly, for the engineer with sufficient "guts" to put ideas into practice.

Among potential methods of bituminous soil stabilization not yet fully investigated, are phenomena associated with capillary and vapor-phase transmission of certain oils normally present in cutback asphalts, deep in soils, giving substantial reduction of capillarity action and having promise of an entirely new form of stabilization. While still being in the general class of "bituminous" stabilization, asphalt itself is not involved, but rather, certain heavy oils capable of both high capillary and some vapor-phase movements in soil, would be used. It appears that possibly mono-molecular oil coatings on soil particles and capillary channels greatly retard the absorption of water, thus achieving efficient type of stabilization. The character of the oily material in effecting a high bond to the soil particle surface in the presence of moisture is critical, but indicated present in many low cost, low-viscosity refinery products. These and probably many more unique but potentially very valuable means for obtaining

(Continued on page 172)

# BIG NEWS in road maintenance:

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### BITUMULS® Slurry Seal



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BITUMULS SLURRY SEAL is a fast, simple, and highly effective technique for getting extra years of satisfactory service out of cracked, worn, or spalled pavements.

The slurry, itself, consists of a mixture of Bitumuls emulsified asphalt and water to which sand or crusher dust (or a combination of both) is added to form a free flowing mix.

#### Typical Slurry Preparation

On a typical successful operation, the Bitumuls emulsion and water were first fed into the drum of a transit mix truck. Then aggregate, conforming to the following gradation, was added slowly to assure complete coating:

| Sieve Sizes | Per cent Passing |
|-------------|------------------|
| Number 20   | 100              |
| " 30        | 91               |
| " 50        | 54               |
| " 100       | 20               |
| " 200       | 5                |

#### Method Of Application

The slurry, delivered to the job in the transit mixer, was chuted into a spreader box, towed behind the mixer truck, onto the pre-watered pavement. (The spreader box was a rectangular, sled-like frame, one traffic lane in width. It was equipped with a rubber strike off, or squeegee blade, which assured even distribution and uniform coating, and forced the slurry into cracks and depressions.)

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... for more details circle 181, page 16

ROADS AND STREETS, May, 1956

## Soil stabilization

(Continued from page 170)

high degrees of soil stabilization through the use of oils and bitumens today lie latent and unused, though vitally needed.

### Need for Tests

We have deferred discussion of the methods of test and the criteria of water-resistance and shear strength necessary for successful design of bi-

tuminous soil stabilization to the last. It has been noted that the lack of a standardized method and adequate criteria has been a severe and undue burden on the average materials engineer endeavoring to design and construct bituminous stabilized bases. The matter of test method alone has been very confusing, in that many different methods have been given in the literature, each representing the development of some individual or organization. Some of these test methods and the criteria that have been proposed represent extremes, and in some cases, highly theoretical and impractical considerations. However, it is encouraging to note that very satisfactory designs have been made from such a number of different method and criteria, and this leads to the belief that the exact method and criteria used is not of extreme importance so long as one other factor is used with not too much frugality. This factor may be called "engineering judgment." This judgment, in turn, may be quite soundly based on a substantial backlog of information and data obtained during the past two decades from numerous constructions and designs.

out undue responsibility on the highway engineer working with this type of stabilization. Asphalt still remains the most abundant and lowest-cost waterproofing material available to the highway engineer. However, if asphalt is to be utilized efficiently, the differences in this material, particularly as they apply to soil stabilization, must be recognized and be put into practice.

It is the writer's opinion that if the proper type of asphaltic material can be obtained, half if not more than half of the problems of bituminous soil stabilization will have been solved. In this same vein, the highway engineer must have the active and sympathetic assistance of the asphalt producer towards making available the kind of asphalt most suitable for this type of construction. Bituminous soil stabilization will never become a major construction type in highway construction unless both the highway engineer and the asphalt producer work sincerely together towards that end.

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### Speeding on turnpike

● Speeders on the Pennsylvania Turnpike will have less chance to avoid arrest than heretofore, with the adoption of a new scheme by the turnpike authorities. Clocks are to be installed in toll booths, by which elapsed time between entry point and exit will be matched against the time necessary to drive the interval at legal speed. A legislative bill legalizing this procedure is to be introduced.

### Compiling Information

A compilation of this information, with a summarization of essential criteria, would be a most worthwhile project for some organization such as, for instance, the Asphalt Institute. The latter organization, with its numerous skilled, technical personnel and its extensive modern laboratory facilities could be invaluable to supporting the development of this field of work. Perhaps the asphalt industry does not need this market, but in this case, the highway engineer does need adequate stabilization information, and it is this need that should be paramount.

In the absence of condensed and pre-digested data and established criteria, are excellent data and information available in many publications, including bulletins and proceedings of the Highway Research Board (2 and 5), proceedings of the Association of Asphalt Paving Technologists (1, 3, 4 and 8) and in issues of this magazine, ROADS AND STREETS (6 and 7). From these, together with the numerous references contained in the HRB and AAPT proceedings, much valuable information may be obtained. However, at the earliest possible date, this information should be assembled by some competent group, that actual design and construction may proceed with a higher degree of assurance, and with-



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## How to Build Teamwork

**A**CHIEVEMENTS of a research and development organization go a long way towards taking care of its morale and other personnel problems.

So spoke W. H. Martin, Army Director of Research and Development, at a three-day management conference held recently at Fort Belvoir, Virginia.

Speaking on a subject of growing interest in highway and all construction work, he said, "it has been my experience that morale and personnel management are not such serious problems if the personnel see that recognized goals are being achieved, and that management knows where it is going and is being acclaimed for its achievements."

The Director stressed that, to achieve these goals, personnel management should be directed toward development of a team attitude. This attitude of working not only for one's self but for the group, the laboratory and the Army, he stated, is in the interest of achieving technological superiority across the board, Army wide, nation wide and free world wide.

Speaking on Executive Development in the Army, William Oncken, Jr., Chief of the Army's Training and Development Division, stressed its dual target. "One is the further development of our own talent, capacities and interest," he told the Laboratory Chiefs, "and the other is to assist in the development of the capacities and interest of those people who report to us." Neither should be neglected, Mr. Oncken emphasized, because what the Army achieves is what the individual achieves.

Conducted by the Corps of Engineers' Research and Development Laboratories at Belvoir, the conference was attended by laboratory chiefs from all the Army's technical services, including Chemical, Ordnance, Quartermaster, Signal, Transportation and Medical Corps. Representatives from the offices of the Adjutant General and Psychological Warfare also participated.

Opening with an address by Col. H. F. Sykes, Jr., Commanding Officer of the Laboratories, it was divided into lecture, demonstration and discussion sessions.

Other speakers included Dr. Nathaniel Stewart, staff consultant for executive development, Bureau of Ships, USN, who presented "Concepts of Executive Development for

R & D Organizations."

Discussions of human relations in leadership, centered on case studies, were led by Arnold Lessard, Chief, Personnel Development Division, National Security Agency; Jack H. Epstein, training specialist, Dept., of the Army Office of Civilian Personnel; Dr. Ralph W. Ruffner, Assistant Dean, School of Education, George Washington University and Mr. A. C. Johnson also from GWU.

Applications of multiple management to a research and development organization were outlined by Mrs. Ethel G. Davis, chairman of the Corps Engineers Research and Development Laboratories' Junior Management Board and Max P. Whitford, chairman of the Labs' Trades Management Board.

Doctor Danzig of the IRHR, Lester E. Bozarth, James W. McGarrity and Flory J. Tamanini, all Corps of Engineers' Research and Development Laboratories personnel, led the group in demonstration "brainstorm sessions."

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... for more details circle 204, page 16



● Pioneer Vibromatic paver laying mat upgrade, supplied by 14-ton trucks. As demonstrated on contract job on California's Foothill Freeway.

## Paver Makes Time Despite Upgrade and Big Loads

**I**MPORTANT answers to problems faced by paving contractors have been produced in the first west-coast demonstration of Pioneer's new bituminous paver, the Vibromatic. This

machine has made a demonstration run under the joint sponsorship of Cook Bros. Equipment Co., of Los Angeles, and Schroeder & Company, asphalt paving contractors of Sun

Valley, Calif. The contractor and the equipment distributor cooperated by assigning the machine to a section of paving on 4.6 miles of Foothill Freeway, near LaCrescenta, Calif.

One of the chief problems faced by paving contractors with the advent of heavier hot-mix trucks has been in the handling of trucks at the paver. It takes considerable power, for example, to push 10-ton truckloads of bituminous hot-mix, especially on upgrades, as must be done by the paving machine while in operation.

The Foothill Freeway demonstration was made on upgrades, downgrades and level paving, using trucks with special Cook Bros. bodies which hauled 14-ton loads of material. On the steepest upgrade on the project — a 600-ft. section with 2.75 percent slope — the paver handled 14-ton truck loads in 4th gear without lugging down. On this same slope the machine paved at 53 f.p.m., leaving behind a mat of excellent texture. The bituminous surface consisted of two courses, each 2 in. thick.

According to general superintendent John Sawyer, several things could be concluded from the test. The new machine was quiet, and its hydraulic steering controls delivered smooth edges without abrupt jogs. The new machine was the most powerful paver Sawyer had seen, and its longer wheelbase delivered a smooth surface and put ample traction on the ground for pushing the heavy truckloads. Its paving speed reached 65 f.p.m. on level ground.

### Prototype Model Used

The machine used in the demonstration was the prototype model field-tested during the 1955 paving season in other parts of the nation. Production models of the new paver were scheduled to appear by March this year.

The machine used on the Foothill Freeway demonstration gave southern California field men their first look at several paver innovations. These include an oscillating toothed strike-off bar and precompactor screed, which deliver accurately metered material for any mat thickness. The oscillating movement tends to fill all voids across the full lane, giving a smooth, dense-textured surface. Following the screed is a 2000-cycle-per-minute heated vibrating compactor which irons out the mat and compacts it to uniform density. Only one 12-ton steel wheel roller was needed behind the paver to finish compaction on the mat.

## OVERMAN STONE AND BITUMINOUS SPREADER



**They use 'em everywhere!**

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Yes, this **IS** the paver for you.

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TODAY

**I. J. Overman Mfg. Co.**  
**BOX 896 MARION, IND.**

... for more details circle 239, page 16

# What's New in Equipment and Materials

Readers Service Coupon on Page 16

## Four-Way Hydraulic Valve

A heavy-duty four-way hydraulic valve, developed by Wisconsin Hydraulics, Inc., 3165 North 30th St., Milwaukee 16, Wis., is designed and engineered for road building machinery and truck mounted equipment. For units up to 20 gpm., the valve features a built-in pressure relief on the tank side allowing "tamper-proof" settings. Direct mounting on reservoir return ports feeds back directly to reservoir, eliminating return lines.

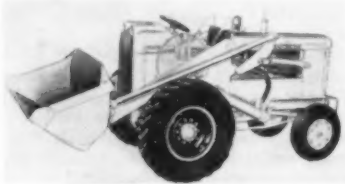


C-Series 4-Way Valve.

For more information circle 122 on Service Coupon Page 16 and mail now.

## Front End Loader

A new front end loader, the 1½ cu. yd. TL-11 Tracto-Loader, announced by Tractomotive Corporation, Deerfield, Ill., is designed for those operations requiring a machine with a large lifting capacity and capable of operating in confined areas. It has front wheel drive for better traction and is equipped with rear wheel power steering. As with all other Tracto-Loader models, it has a 3:1 torque converter and a clutch-type transmission which permits changes in the direction of travel without shifting gears.



TL-11 Tracto-Loader

At the normal carrying height of 3 ft., the bucket can be tipped back to an angle of 41°. This carrying angle enables heaped loads to be carried without spillage. At ground level, the bucket can be tipped back 22°. Maximum clearance under the hinge pin when dumped is 10 ft. 3 in., and at this dumping height the machine has a reach of 2 ft. 7½ in.

Over-all length of the TL-11 with the bucket in the carrying position is 15 ft. 4 in. In this position the machine can turn in a radius of 12 ft. 3 in. Power is

furnished by either a 63 hp, 4 cylinder gasoline engine or a 77 hp, 6-cylinder diesel. A 12 volt electrical system is provided with the diesel model.

For more information circle 123 on Service Coupon Page 16 and mail now.

## Moto-Buy Has Tilting Mast

An important improvement to its Model S-10 Moto-Buy has been announced by Kwick-Mix Co., Port Washington, Wis., a subsidiary of Koehring Co., Milwaukee, Wis. Future production models of the 3-wheel fork lift unit can be equipped with an optional double acting hydraulic valve that enables an operator to tilt the mast and raise loads with one hand.

With the new hydraulic lift attachment the Moto-Bug mast can be tilted 10° toward the rear to assure better load balance or 2° forward to aid in picking-in



Moto-Buy with Tilting Mast

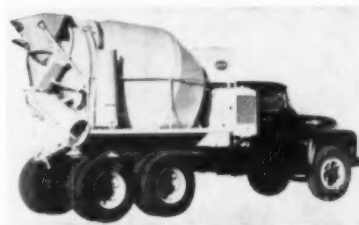
or releasing a load. Standard forks are 30 in. in length and adjustable from 6 to 32 in. in width. The S-10 has a rated lift capacity of 1000 lb. at 15 in. load center with maximum lift to 6 ft. height. Turning radius is established at 61 in.

For more information circle 124 on Service Coupon Page 16 and mail now.

## Improved Transit Mixer Line

An improved line of Westinghouse transit mixers in five sizes, 4½ to 6½ cu. yd., announced by Westinghouse Transit Mixer Division of LeTourneau Westinghouse Co., 217 S. Belmont Ave., Indianapolis, Ind., features a fully enclosed gear drum drive, two-speed transmission, double-action mixing drum, and a new swing-away chute to permit direct discharge.

The fully enclosed gear drum drive is an exclusive Westinghouse feature that is claimed to cut maintenance expenses drastically because there are no exposed gears or chains to wear out and break. A time-proven, two-speed transmission permits a wide range of rotating speeds at efficient engine operation. These features are coupled with the exclusive Westinghouse double-action mix-



New Westinghouse Transit Mixer

ing drum which has six auxiliary reverse mixing blades stated to assure faster, better and more uniform mix in less than the minimum turns specified on the rating plate.

The new swing-away discharge chute eliminates the need for removing and replacing the chute head when the truck mixer is discharging into high forms, hoppers and/or buckets. Also exclusive with Westinghouse is the self-aligning drum mounting which eliminates the possibility of trouble arising from truck and mixer frame flexing on rough terrain. Misalignment is prevented by a ball-and-socket front end mounting at the drum.

For more information circle 125 on Service Coupon Page 16 and mail now.

## Speed Mixer All-Purpose Preparer

A new low cost Speed Mixer, announced by Pettibone Wood Mfg. Co., subsidiary of Pettibone Mulliken Corp., Box 620, 6900 Tujunga Ave., North Hollywood, Calif., is claimed to incorporate all of the proven features of travel-plant mixing, plus pulverizing, blending and material processing for base stabilization. A heavy duty rotor, chain-driven from both ends, produces balanced power and a positive drive. The rotor blades are uniformly spaced across the full width of the shaft to produce a thorough, full-panel mix in fewer passes.

One engine drives both the rotor and the pump, thus synchronizing travel speed and mixing. This one-engine-drive also reduces maintenance and fuel costs, and simplifies the entire operation. The speed mixer applies bituminous or other binders through a spray bar just ahead



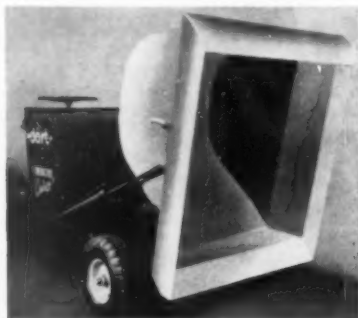
Pettibone Wood Speed Mixer

of the rotor. It is equipped with all the necessary power controls, all easily accessible to the operator. Binders are pumped from supply tanks and injected into the material through an adjustable high pressure by-pass metering system on the Speed Mixer.

For more information circle 126 on Service Coupon Page 16 and mail now.

### Concrete Wagon

A new concrete wagon, "Construction Cruiser," has been announced by Dart Manufacturing & Sales Co., 1002 South Jason St., Denver, Colo. It has an 18 cu. ft. concrete capacity and is powered by an 8 hp. Wisconsin motor. It has a hydraulic pump, giving any desired amount per 1 cu. ft., to the whole load. It weighs 1325 lb., height to top of steer-



"Construction Cruiser" Concrete Wagon

ing wheel is 48 in., width, 44 in. and length 83 in. Other features include: Front wheel drive, double compensating clutch, Borg-Warner differential and transmission, Timken bearings and Load Air drive wheels, an attachable dozer blade, hydraulically controlled for gravel leveling or back filling, positive operator or drive controlled. The wagon is suitable for transporting materials for street and highway patching and leveling with dozer.

For more information circle 127 on Service Coupon Page 16 and mail now.

### Short-Stroke Gasoline Engine

A new short-stroke, air-cooled gasoline engine, announced by Kohler Co., Kohler, Wis., is designed for construction,



K330 Gasoline Engine.

heavy-duty farm and industrial applications.

Designated as the K330, the new engine delivers 12.5 hp at 3200 rpm, and combines medium weight — 175 lb. — with high capacity and power output.

The K330 is a single cylinder, 4-cycle, air-cooled engine equipped with fly-weight governor, oil-bath air-cooled engine equipped with fly-weight governor, oil-bath air cleaner, silencer-type muffler, fuel pump, oil pressure gauge, "Eatonite" exhaust valve insert and exhaust valve rotator. It will also be made available in a number of optional models that will include direct mounting crankcase, reduction gear, hand clutch, and electric starter and generator.

The short stroke is stated to cut engine friction over 30% and to increase piston ring life by more than 50%.

The K330 produces 8.2 hp. at 1800 rpm, 10.2 hp. at 2400 rpm, 12.3 hp. at 3000 rpm and the peak output at 12.5 hp. at 3200 rpm. Foot pounds-of torque range from 23.8 at 1800 rpm to 20.3 at 3200 rpm. The bore is 3 1/8 in., the stroke 3 1/2 in. and the piston displacement is 53.6 cu. in.

For more information circle 128 on Service Coupon Page 16 and mail now.

### Concrete Cutting Machine

A new concrete cutter, announced by Champion Manufacturing Co., 2028 Washington Ave., St. Louis, Mo., has the following features: Dual blade



Model CS-500

guards, balanced construction so the saw can easily be tilted backward or forward for fast alignment, a front guide that can be lifted from the operators position at the dashboard, and a direct drive power unit.

Other Champion features include a double and spindle so you can cut in either direction along walls and obstructions, a positive screw action for raising or lowering the blade, and genuine 4-wheel suspension, so the cutting line is not disturbed if one wheel moves up or down.

The model CS-500 shown here has a 14.6 hp. air cooled gasoline engine, and

is stated to be especially efficient for trenching, patching, and highway work.

For more information circle 129 on Service Coupon Page 16 and mail now.

### Self-Propelled Road Sweeper

A self-propelled road sweeper, placed on the market by Little Giant Products, Inc., 1600 N. Adams St., Peoria, Ill., is a combination of a prime mover and rotary brush assembly, each with its in-



Little Giant SP-C Road Sweeper

dividual engine. The prime mover has a heavy duty, 48 hp industrial engine, water cooled and electrically started. The brush is powered by a 7 hp air-cooled engine.

The SP-C prime mover has an automotive type, easy shifting, four speed transmission. Rear wheel steering provides 11 ft. turning radius. Weight has been concentrated on front drive wheels where power and traction are needed. Speeds up to 4 mph are possible for travel between jobs, and safety is assured with hydraulic brakes and excellent visibility.

The machine is 4 ft. 3 in. high and, complete, is 11 ft. 6 in. long. Brushes may be obtained in three lengths — 6, 7 and 8 ft. The brushes are of tough, durable palmyra fibre and can be re-bristled.

For more information circle 130 on Service Coupon Page 16 and mail now.

### Tamping and Compaction Rollers

A new line of compaction equipment has been announced by Chester Products Co., a division of Ransohoff, Inc., North Fifth and Ford Blvd., Hamilton, Ohio. The line includes three models of tamping rollers.

Model 1760 weighs 6050 lb. when empty of water ballast. Drum diameter is 40 in., width 48 in., with 88 ft. per drum. Total weight of double drum roller with water ballast is 10,487 lb. Optional round feet increases pressure per square inch approximately 35%.

Model 4840 has a drum diameter of



Model 6060 Tamping Roller

40 in., width 48 in. and 104 ft. per drum. Total weight of double drum roller equipped with wedge feet with water and sand ballast is 18,284 lb. Adjustable cleaning bars are standard on the rear and optional on the front. Round or sheepfoot are optional.

Model 6060 has a drum diameter of 60 in., and a width of 60 in., with 120 ft. per drum. Total weight of the double drum roller equipped with wedge type with water and sand ballast is 43,128 lb. Adjustable front and rear cleaning bars are standard on this model. The extra heavy channel type draw bar, extra heavy channel type frame and sealed Timken bearings permit relatively easy conversion of the roller to meet specified compaction jobs.

A 50 ton pneumatic compactor Model 50T4, also is included in the line. The compactor has four wheels with tire size 18:00x25:00 20-ply. Each wheel is individually assembled to a ballast compartment exerting a maximum load per tire of 25,000 lb. All compartments are hinged about a 12 in. diameter pivot axle permitting maximum oscillation of 24 in. Total weight of Model 50T4 with ballast is 100,000 lb. Turning radius is 10 ft. Tires are easily changed by elevating the entire compactor at the draw bar and a rear push pad is provided for momentary assistance, should the unit become stuck in heavy loose soils.

For more information circle 131 on Service Coupon Page 16 and mail now.

### 600 Ft. Rotary Portable Compressor

A new 600 ft. rotary portable compressor, the Joy Airvane, has been announced by Joy Manufacturing Co., Oliver Bldg., Pittsburgh 22, Pa.

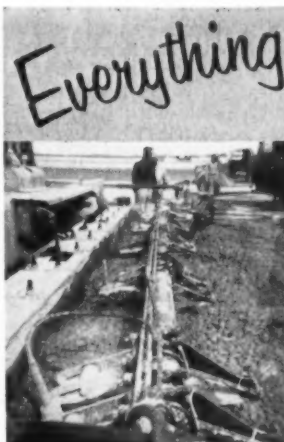


Joy Airvane Rotary Compressor

Manufacturer states that this machine contains several Joy developments that contribute substantially to the evolution of the rotary compressor as a practical construction tool. The Thermal By-Pass feature, heart of the Airvane temperature control system, is stated to result in uninterrupted performance and economy. A controlled-velocity filter-separator unit with primary and secondary action removes oil from the compressed air with notable efficiency.

The Joy Airvane rotary is built for rough field usage. Exterior housing, of high-strength steel, is weatherproof. Low center of gravity and short turning radius (13 ft.) are for maneuverability.

For more information circle 132 on Service Coupon Page 16 and mail now.



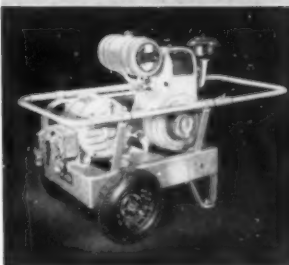
JACKSON PAVING TUBE  
(INTERNAL TYPE)



JACKSON SIDE FORM  
VIBRATOR



JACKSON VIBRATORY  
SCREED



JACKSON POWER PLANT

**FOR SALE OR RENT  
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DISTRIBUTOR**

## Everything **FOR MORE PROFITABLE PAVING**



Jackson Multiple Vibratory Compactor

### MACADAM BASE COURSES, SUB-BASES, SOIL-CEMENT PAVING, FILLS

The JACKSON MULTIPLE COMPACTOR has now thoroughly demonstrated that it is by far the most advantageous equipment for achieving or exceeding specified densities in rock, slag, sand, gravel . . . all granular soils used in waterbound and penetration macadam construction, and in filling the voids in rock and slag courses with fines. The Jackson does it in about half the time required with other types of equipment. It is equally efficient for consolidating large granular soil fills such as bridge approaches and kindred projects.

### JACKSON INTERNAL TYPE PAVING TUBE

Supplied with extraordinarily powerful motors, no concrete highway or airport paving job is too tough for this improved machine. Tubes vibrate deep in concrete, quickly plasticizing harsh dry mixes in slabs to 24" thick and as wide as 25'. It saves time, saves cement; provides greater density and compressive strength. Cuts spreading costs where no spreader is used. The tube is made up of one unit as shown for each 5'-0" (maximum) of slab width. Usually attached to front of finisher and controlled by finisher operator. Power is supplied by a Jackson Power Plant mounted on the parent equipment.

Use of a JACKSON Side Form Vibrator on standard finisher assures thorough consolidation and plasticity of concrete at side and center forms — with no "missed" spots. Labor savings effected quickly repay cost of equipment.

### MUNICIPAL PAVING — BRIDGE DECKS, ETC.

For jobs of this type a JACKSON Vibratory Screed and Portable Power Plant is the most convenient, productive and inexpensive outfit you'll find anywhere. Strikes off to any crown, undercuts at curb and sideform, works right up to and around all obstructions. Two men easily handle it on all slabs up to 30 feet wide, and it may be rolled back for second passes on 4 rollers.

**PORTABLE POWER:** Thoroughly reliable, time-proved plants in capacities of 1.5 to 7.5 KVA . . . equipped with permanent magnet generators requiring no maintenance or adjustment. They provide both single and 3-phase 120V., 60 Cy., AC and may be used for lights as well as operating all JACKSON equipment.

**JACKSON VIBRATORS, INC.**

LUDINGTON

MICHIGAN

. . . for more details circle 227, page 16

## Engineering Improvements in 4 Tractor Models

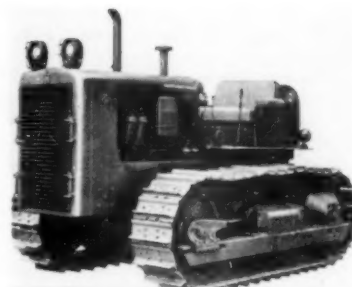
International Harvester Co., Chicago, Ill., has announced the introduction of its newest and most advanced-engineered crawler tractor line, comprised of four models, the International TD-18, TD-14, TD-9 and TD-6. Principal engineering changes in these new models, according to the company's Industrial Power Division, are substantially increased horsepower ratings in the TD-6, TD-9 and TD-14; modern streamlined "new look," better operator visibility; Cerametallic clutch facings; pressurized covering systems; 500-hour track roller seals and all-weather, positive, easy-starting conversion systems.

The TD-6 crawler tractor now is rated at 41.5 hp. Matching the increase in hp

output is a strengthened power train. Important improvement on the TD-6 is the new Cerametallic clutch facing. This clutch facing is composed of heat-resisting material similar to that used as brake linings on jet aircraft. It is claimed the clutch now gives more rapid and positive engagement with new heat-resisting, and power-holding characteristics.

The TD-9 crawler tractor now is being produced with a 54.5 drawbar hp and belt horsepower is increased to 66 hp. The TD-9 also uses the new Cerametallic clutch facings, and features improved visibility due to better streamlining of the unit.

On the model TD-14, the drawbar hp has been increased to 78.5. Belt hp has been upped to 89.5 hp. Like the TD-6 and TD-9, the TD-14 has Cerametallic clutch facings, better operating facilities,



International TD-18 Tractor

new hydraulic steering clutch boosters and streamlined appearance.

The most outstanding engineering changes on the TD-18 are new 500-hour track roller seals, heavier radiator guards, and improved streamlined appearance. International's fast gasoline-conversion, electric starting system is provided as standard equipment. The TD-18, also featuring as standard equipment the Cerametallic clutch, with other design features that are pointed to lowering maintenance costs. Lubrication of the steering clutch assemblies has also been centralized. Pressurized cooling is provided. The TD-18 produces 124 hp at 1450 rpm and the drawbar pull is 24,300 lb. Drawbar hp is 103.

For more information circle 133 on Service Coupon Page 16 and mail now.

## Link-Belt Speeder Enlarges Shovel-Crane Line

The largest production model shovel-crane yet produced by Link-Belt Speeder, the 3 cu. yd. K-608, has been added to the line manufactured by Link-Belt Speeder Corp., Cedar Rapids, Iowa.

The crawler-mounted K-608 is convertible to shovel, crane, dragline, clamshell and piledriver attachments. The machine is designed for 3 yd. shovel operation with rated crane lifting capacity of 75 tons at 12 ft. radius.



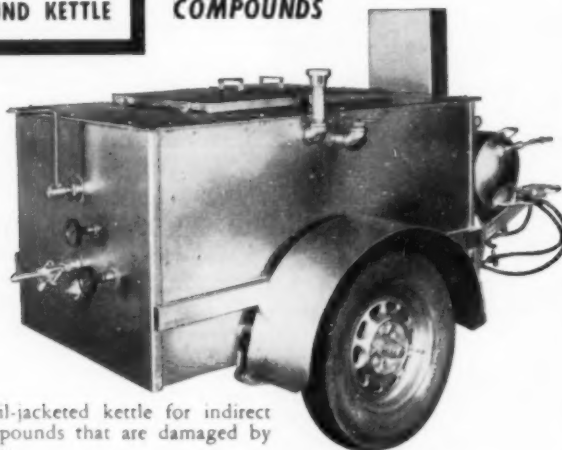
Link-Belt Speeder K608, 3 cu. yd. Shovel

The K-608 features Speed-o-Matic true power hydraulic control, a fingertip-operated, quick-response system. Hydraulic pressure is produced through a pump driven by the engine. Pressure is metered to the clutches by variable pressure control valves that the operator opens and closes with short, fingertip controlled levers to provide immediate, smooth actuation of all clutches. It also offers power hydraulic-actuated steering clutches.

# White

F-10 COMPOUND KETTLE

... FOR LOWER COST  
MELTING OF JOINT  
COMPOUNDS



**TOP QUALITY**, oil-jacketed kettle for indirect heating of compounds that are damaged by high temperatures.

**FOOLPROOF** manual burner adjustment.

**LOW COST** of \$998 f.o.b. factory, complete with two thermometers (one for heating-jacket oil, one for compound), manual agitator, oil burner, steady rest, towing eye, tires. Engine agitator or propane heating available

**CAPACITY**: 120 gallons of compound

FOR LITERATURE, WRITE

**WHITE MANUFACTURING COMPANY, ELKHART 20, INDIANA**

... for more details circle 268, page 16

## OTHER PRODUCTS

Asphalt Plants,  
Tool Heaters,  
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Torches and Burners



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**Swenson Spreader & Mfg. Co.**  
Lindenwood, Illinois

Speed Sealcoating Jobs  
with  
**SWENSON SPREADERS**

... for more details circle 282, page 16

Standard power equipment consists of torque converter and engine combination which are matched for greater horsepower. The converter also provides for closer control and smoother operation in crane work.

Both the upper and lower frames are all-welded and stress-relieved to insure maximum strength and life under severe, shock-loading conditions. All shafts are easily accessible for quick, easy inspection and maintenance.

An independent, positive chain crowd offers two crowding speeds. Boom angle changes are permitted without chain adjustment. Digging brakes are controlled from the cab and serve as both steering and digging brakes. Hydraulically actuated, they have capacity to hold the machine on any workable grade. Spring-loaded and hydraulically released, they are applied automatically when travel jaw clutches are disengaged.

A significant feature for a machine of this size is the K-608's rigid track drive assembly, which is designed to hold the chain sprocket and track drive sprocket in positive alignment at all times.

The K-608 has a ground clearance of 18 in. on the 7-roller frame model and 24 in. on the 9-roller frame type. These clearances are possible since the traction shaft assembly is completely enclosed, without underhang, within the lower frame. Bevel gears run in oil.

For more information circle 134 on Service Coupon Page 16 and mail now.



## to things in Cleveland



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PUBLIC AUDITORIUM



CLEVELAND BRONIES



200 MUSICALS



SYMPHONY



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Hotel



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### Grader Blade for Tractors

A new, center mounted grader blade for International Harvester "300" utility tractor and other industrial tractors, has been introduced by J. R. Prewitt and Sons, Pleasant Hill, Mo.



Willimon Grader Blade

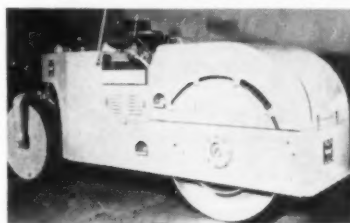
Built exclusively for heavy-duty work, the new Willimon blade is designed to do a precision job of grading on even the roughest terrain. Its center mounting utilizes the full weight of the tractor in maintaining a smooth operation. Rear wheels of the tractor follow the blade's path — eliminating bounce. Stabilizing arms on either end of the blade give greater control, and double action hydraulic cylinders provide a constant pressurized grading force.

The 6 (or 8) ft. moldboard angles 30° to the right or left manually. Depth and angle of cut are controlled hydraulically. Because of its location, the greater blade is constantly visible to the operator and supervision of the grading job is easier. The blade may be installed or removed from the tractor in a matter of minutes.

For more information circle 135 on Service Coupon Page 16 and mail now.

### Tandem Rollers with Torque Converter

A completely new line of medium and large size variable weight tandem rollers, announced by Huber-Warco Co., Marion, Ohio, features a torque converter and two-speed transmissions as standard equipment. All four models in the new line — the medium sized 5-8 and 8-10 rollers and the large 8-12 ton and 10-14 ton tandems — are identical in design.

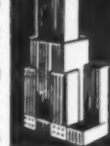


New Huber-Warco Roller

On all four machines the torque converter is stated to more than double the available power and to supply it instantly when needed. Other benefits claimed for the unit include a decrease in fuel consumption; longer life of the engine, forward-reverse clutches and other machine components; elimination of shock loads, stalling, over-loading, and the need for a master clutch. Through use

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RADIO CITY  
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SHELTON



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Fine Food  
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Pool and  
Monte Proser's  
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BE SURE TO STOP AT  
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NEW  
Hamilton Hotel  
20 S. Dearborn St., Chicago



of a tail shaft governor, the roller will closely maintain the speed set by the operator automatically, regardless of the grade encountered.

Huber-Warco linked the torque converter to a specially designed two-speed transmission to get increased efficiency and more economical operation, particularly at slow rolling-speeds. The combination of a torque converter and two-speed transmission makes the correct gear ratio available to meet any work load. It does this by keeping the tail shaft speed well within the efficiency limits of the tail shaft governor, regardless of the speed of the roller. Another outstanding feature of the new Huber-Warco tandem line is a completely adjustable guide roll assembly to eliminate road "scuff." Both the compression roll and guide roll rotate on adjustable tapered roller bearings, assuring long life and maximum efficiency.

Other important features of the new tandem line include removable design of the kingpin mounting; two completely independent braking systems; a variable speed hydraulic steering system; unusually close curb clearance; a final drive mounted in the frame; a cooling system which draws clean air from above the rear end of the roller; an all-welded frame with corners double welded and braced; and a choice of gasoline or diesel power in all models.

For more information circle 136 on Service Coupon Page 16 and mail now.

#### **¾ Cu. Yd. Excavator**

A companion model excavator in the ¾ cu. yd. class, similar in basic design to the firm's new and modern ½ and 1-cu. yd. machines, has been announced by Koehring Co., Milwaukee 16, Wis. Designated Model 305, it has a rated lift crane capacity of 25 tons on truck chassis, 15 tons on crawler mounting and can be equipped with a full complement of attachments.

According to officials of the Koehring Co., features incorporated in the Model



Model 305 Koehring Excavator

305 promote ease of operation and reduce maintenance costs. The upper machinery has been simplified to contain only two major horizontal shafts. The all-welded turntable is equipped with integral sidestands and main cross shafts revolve in antifriction bearings.

All safety and wear resisting features of larger Koehring excavators are embodied in the 305, including self-cleaning crawlers, automatic traction brakes, a newly designed cab and operating

lever arrangement and a mechanical cam type booster clutch on the main drum clutches.

The hoe attachment for the 305 provides an increase in digging depth to 20 ft. and modified line speeds increase hoe productivity by 10%. The hoe dipper pulls tight to the boom for added production efficiency and side cutters are used to full advantage to widen a trench or dress an excavation.

For more information circle 137 on Service Coupon Page 16 and mail now.



F-12 Loader

#### **Tractor Loader**

A new hydraulic loader has been introduced by the Farmhand Co., Hopkins, Minn. Designated the F-12, this loader mounts on most low-profile tractors now being used for non-farm loading and lifting.

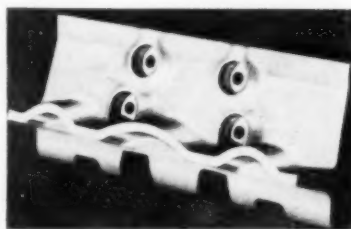
It has a 2000-lb. breakaway strength and 1000 lb. lift. Double-acting hydraulic cylinders are used for lifting and for controlling the bucket. Special cross-tie equalizes stress, adds to stability, minimizes sidesway. Exclusive Farmhand "balanced load" construction with high life-arm pivot point, combines high, 10 ft. lift with close-in load support at lower positions for easy tractor handling. Loader design makes it easy to get on and off tractor from the side.

The F-12 is available with both 9 and 16-cu. ft. materials buckets which can be attached in minutes. There is also a small dozer blade and dozer blade extension.

For more information circle 138 on Service Coupon Page 16 and mail now.

#### **Grouser Shoe Gives More Surface Contact**

A new track-type tractor grouser shoe designed to give 15% more surface contact without increased width has been announced by Shunk Manufacturing Co., Bucyrus, Ohio.



Gripper Grouser Shoe

Called the Gripper grouser shoe, the new track shoe obtains its extra surface area by means of a grouser shaped in the form of several continuous curves, thus providing more surface area within the same over-all width consumed by conventional straight-across grousers.

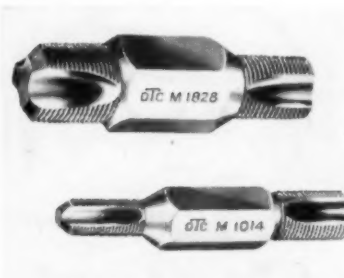
Other features claimed for the Gripper grouser shoe include greatly increased flotation without traction loss, reduced side-slip and fish-tailing, and increased tractor rail, frame and bushing and pin life through reduction of unnatural side stresses.

For more information circle 139 on Service Coupon Page 16 and mail now.

#### **Spark Plug Hole Cleaning Tool**

Spark plug hole thread cleaning tools designed to clean carbon from all standard size spark plug holes have been announced by Owatonna Tool Co., 435 N. Cedar St., Owatonna, Minn. The tool, according to the manufacturer, cleans carbon from the thread area of spark plug hole and cuts away the collar like deposit of carbon which usually forms at the bottom of spark plug holes after a period of operation.

Two spark plug hole cleaning tools are available, each with a different size cleaner at either end. They will fit 10MM, 18MM, and ⅜-18 thread size holes. With the two tools, the need for expensive thread taping dies is eliminated. Practically every standard automobile engine can be serviced.

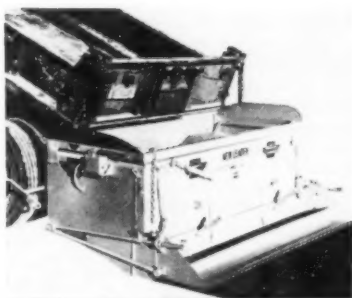


OTC Spark Plug Hole Thread Cleaning Tools

For more information circle 140 on Service Coupon Page 16 and mail now.

#### **Bituminous Concrete and Aggregate Spreader**

The new 1956 Model AS bituminous concrete and aggregate spreader, announced by Highway Equipment Co., Inc., 616 D Ave., N.W., Cedar Rapids, Iowa, is completely redesigned with many exclusive features. One important feature is an accurate scale on each end of the screed permitting the operator to instantly make the correct setting for the thickness of spread he desires. The wheelbase has been increased permitting the floating screed to travel on a level plane spreading accurately at all times regardless of the base. The screed can be instantly locked into a fixed position for the correct depth desired when spreading base materials. It has improved quick hookup for carrying spreader on the back



New 1956 Model AS

of the dump truck and off the ground from one job to another. Offered as optional equipment is the improved hand operated hydraulic shut-off gate that stops the flow of material and eliminates the necessity of emptying the spreader when changing course — assures clean and even cut off at end of each pass. The screed can be ordered with adjustments for crowning jobs, also attachments for quickly heating the screed.

For more information circle 141 on Service Coupon Page 16 and mail now.

### 15 Ton Trailer

A new tandem tilt-to-load trailer available in capacities of 25,000 to 30,000 lb., has been announced by Dorsey Trailers, Elba, Ala. The model can easily be tilted by the weight of one man. Rear lights are recessed for protection in rear structural channel.



New Dorsey Trailer

For more information circle 142 on Service Coupon Page 16 and mail now.

### 2-Lever Air Operation for Shovels and Cranes

A new type of air controls available on 8 models of Lorain power shovels and cranes has been announced by The Thew Shovel Co., Lorain, Ohio. These 8 models range from 20 to 30 ton capacity on crawler and rubber tire mountings.

These new "Air-Ease" controls operate all friction clutches by full metered-air power. Only two levers are used to control all the following operations: boom derricking, boom brake, swing, crowd, retract, hoist, clam holding, drag-in, power load lowering and third drum. On self-propelled rubber tires Lorain's travel is also controlled by metered air.

These 2 developments are claimed to reduce manual effort to a minimum to provide easy, finger-tip control. In addition, because there is just one lever for each hand, no hand switching is required so that the operator has more precise, faster control. However, the "feel" of the machine is retained with the use of "metered" air valves.

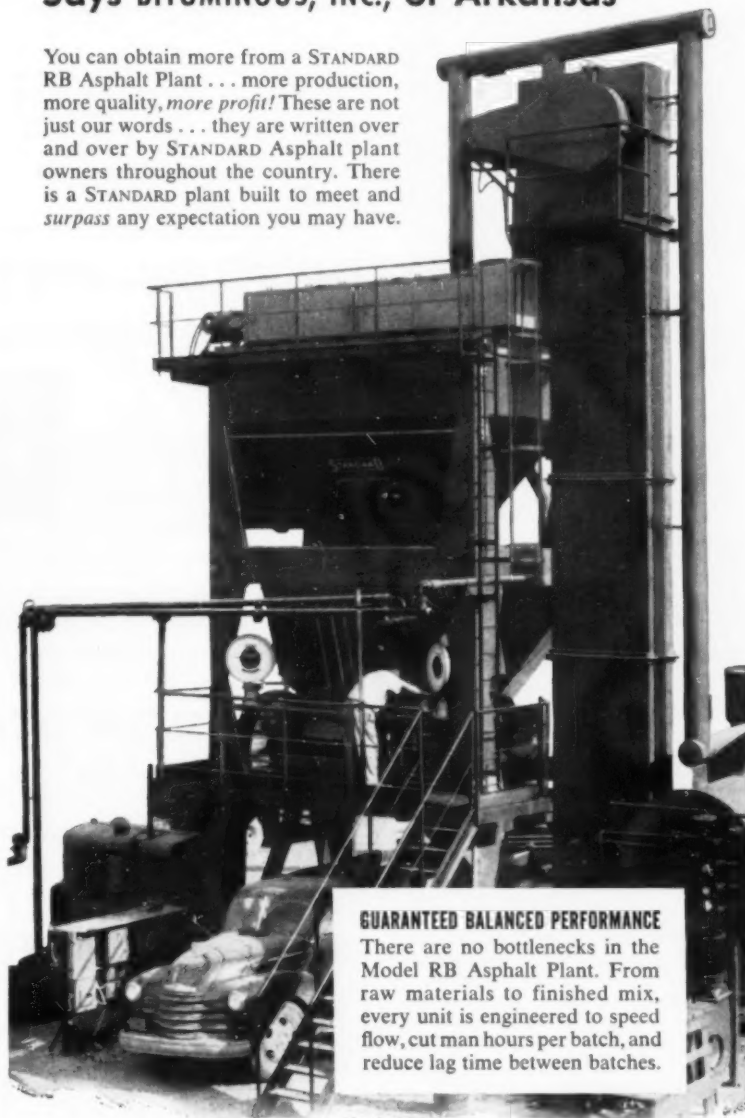
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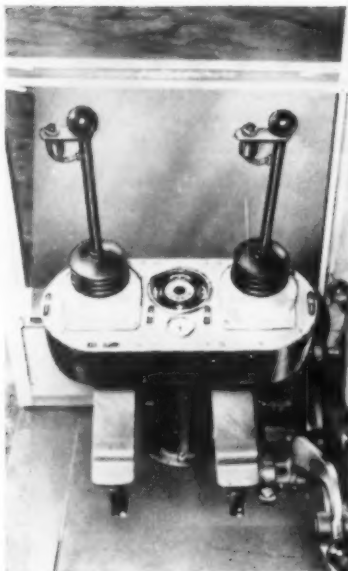
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**STANDARD STEEL CORPORATION**

5003 Boyle Ave., Los Angeles 58

15 Park Row, New York 3

. . . for more details circle 255, page 16



"Air-Ease" Controls for Lorain

The operator of a Lorain with this 2-lever control, has both hands on the levers at all times and by slight motion to right or left or forward or back, can engage any single operation or by moving the lever diagonally between any of these positions, can get various combinations of operations. For example, it is possible by moving a single lever in one direction into such a "quarter" position to combine (1) hoist and crowd, or (2) hoist and retract, or (3) swing and boom up.

For more information circle 143 on Service Coupon Page 16 and mail now.

#### 10 Yd. Self Propelled Scraper

A new CCS Wooldridge "Cobrette" 10 yd. self-propelled scraper, now being delivered by Wooldridge Manufacturing Division, Continental Copper & Steel Industries, Inc., Sunnyvale, Calif., features an exclusive new hydraulic "Gear Steer," fluid coupling drive, and special tractor design enabling it to assist in push-loading companion units.

Rated at 7.5 cu. yd. struck and 10 cu. yd. heaped, the 143 hp diesel powered unit has speeds up to 30 mph. It is equipped with four 18:00 x 25 tires for ample flotation and traction. Versatility and ease of operation under widely varying conditions are said to be achieved by the unique power train which includes the fluid coupling, air actuated clutch



CCS Wooldridge "Cobrette" Scraper

and transmission, and an exclusive readily accessible gear transfer case permitting

easy interchange of the two standard gears to provide optional gear ratios for most effective use of power on each job. This change may be accomplished in the field in approximately two hours without special tools or extra parts. Cable control unit is also air actuated.

For more information circle 144 on Service Coupon Page 16 and mail now.

#### 900 cfm Rotary Portable Compressor

A new 900 cfm compressor has been added to the line of Gyro-Flo compressors of Ingersoll-Rand Co., 11 Broadway, New York 4, N.Y.

Weighing only 14,340 lb. ready-to-go, the GYRO-FLO 900 is only slightly larger than the Gyro-Flo 600 introduced by Ingersoll-Rand in 1950. Driven by the General Motors Series 110 diesel engine, the 900 takes full advantage of

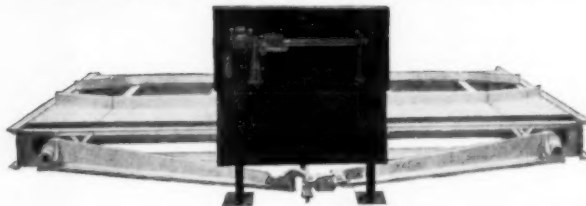
modern speeds. The design of this 6-cylinder engine enables it to maintain rated brake horsepower at high altitude, and its 24 volt battery and ether-capsule system permits sure-fire starting at extremely low temperatures. This new 900 size, delivering full 900 cfm at 100 psi, is stated to have ample capacity to operate ten jackhammers or seven wagon-jacks (with light drifters) or three wagon drills (with heavy drifters).

For more information circle 145 on Service Coupon Page 16 and mail now.

**Refer to  
Roads and Streets  
Often**

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... for more details circle 273, page 16



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State Office Building  
Madison 2, Wisconsin

... for more details circle 269, page 16

**ROADS AND STREETS, May, 1956**

## Manufacturers' Literature

### Transit Mixers

A new 16-page illustrated bulletin No. 256, released by Westinghouse Transit Mixer Division of LeTourneau-Westinghouse Co., Indianapolis, Ind., covers the complete line of 1956 Westinghouse transit mixers. In addition to listing dimension and specification data on the 5 new models (4½; 5; 5½; 6 and 6½ cu. yd.), the bulletin illustrates and describes fully the Westinghouse transit mixer exclusive features. Other construction, controls and operating features are illustrated. Also shown is the complete line of optional equipment: quick-opening hatch, drum closure, hydraulic chute lift, flush and measuring tanks and drum revolution counter. A page is devoted to the Westinghouse power-take-off drive, offered as an alternate drive on all Westinghouse transit mixers. The complete mixer, equipped with Westinghouse P-T-O, may be installed on any standard or cab-over-engine truck chassis.

For more information circle 146 on Service Coupon Page 16 and mail now.

### Portable Batching Plants for Aggregate and Cement

A new bulletin (No. 2488) on its aggregate and cement portable batching plants, issued by Blaw-Knox Co., Construction Equipment Division, Mattoon, Ill., contains information valuable to contractors. The 41-page illustrated booklet covers portable bulk cement plants, portable aggregate plants, and portable one-stop plants. Features, capacities, and dimensional data are given on each type of plant. A check list in the back of the bulletin itemizes points of consideration before buying a plant, enabling the contractor to order the plant most suited to his requirements.

For more information circle 147 on Service Coupon Page 16 and mail now.

### Concrete Gunning Equipment

A new 16-page catalog, announced by Air Placement Equipment Co., 1009 W. 24th St., Kansas City 8, Mo., gives complete details, specifications and operating capacities of its equipment. It also contains the answers to many, often-asked questions about air placed or gunned concrete. Also included are several pages of actual job application photographs showing the many and varied uses of this modern equipment. A feature of the catalog is the complete description of the new Airplaco portable concrete gunning rig (a combination of several pieces of equipment which form a unit consisting of the equipment needed for any concrete construction, maintenance or restoration job).

For more information circle 148 on Service Coupon Page 16 and mail now.

### 3-Axle Walking-Beam Tandem Rollers

A 12-page bulletin S-71-1255 on "3-Axle Walking-Beam Tandem Rollers" has been released by Buffalo-Springfield Roller Co., Springfield, Ohio. In addition to giving complete specifications on the 13-20 ton Model KX-25E roller, the new bulletin illustrates graphically Buffalo-Springfield's exclusive "Walking-Beam Compaction Control." Power roll brakes, synchronized hydraulic steering, the 4-speed transmission and the bevel gear final drive are four of the 20 outstanding construction features illustrated and described in detail in the new bulletin. All standard and optional equipment is shown. Dimensions, specifications, unballasted and ballasted weights, and compression data are given in tabular form for quick reference.

For more information circle 149 on Service Coupon Page 16 and mail now.

### Brush Control Sprayer

Equipment for chemical brush control is described in a new 8-page, 2-color catalog L-1114, issued by John Bean Division, Ford Machinery and Chemical Corp., Lansing, Mich. Models listed include the 20-MTB Range for mounting on a pickup truck or power wagon; the Model 14-MTB for medium-capacity high-pressure performance; the Model 70-MTBT trailer sprayer; and small brush sprayers for dormant and basal brush control. Cutaway illustrations are used to emphasize details of construction and operation of the Royale pump and other components. Text matter describes pertinent features of the brush-control sprayers. Tabulated data list specifications and dimensions.

For more information circle 150 on Service Coupon Page 16 and mail now.

### Transits

A 4-page brochure on its new Model 2-CFS transit is available from Warren-Knight Co., Dept. F., 136 N. 12th St., Philadelphia 7, Pa. Features claimed for the new transit include assured accuracy, advanced design, special and exclusive features, sturdier construction and a minimum of maintenance and repair costs. Specifications and features of advantage are given in its brochure.

For more information circle 151 on Service Coupon Page 16 and mail now.

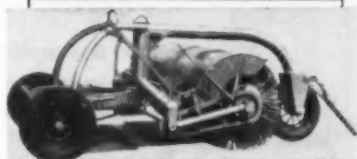
### Two New Engines

A new broadside (Form No. 31914) issued by Caterpillar Tractor Co., Peoria, Ill., describes the 310 HP D337 (Series F) engine and the 200 HP D326 (Series F) engine. Both the new D326 and the turbocharged D337, contain a host of Caterpillar's recent engineering and research developments. A great many possible engine arrangements are available. These are all described in the broadside.

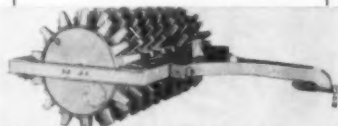
For more information circle 152 on Service Coupon Page 16 and mail now.

(Continued on page 196)

## Grace ASPHALT AND COMPACTION EQUIPMENT



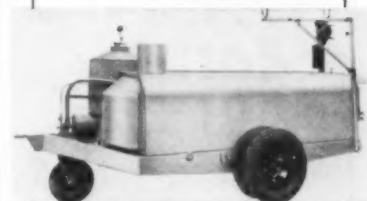
Roadsweepers, traction, engine-driven or tractor-mounted



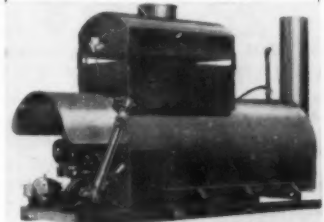
Sheepsfoot rollers



Chip spreaders



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Automatic oil heaters for hot plants



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... for more details circle 274, page 16

# JUST OFF THE PRESS

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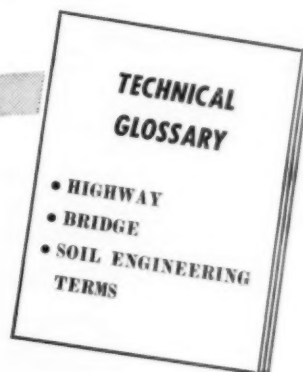
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neers, a decision was reached to prepare such a glossary. To further extend its usefulness, soil stabilization and associated laboratory work was included.

The manuscript for this book of over 35,000 terms was over 15 years in preparation under E. W. James, then Chief, Inter-American Regional Office, U. S. Bureau of Public Roads, working with the Library of Congress of the United States. It has been approved by a committee of five bilingual engineers of the Mexican government under the chairmanship of Sr. Ing. J. Fco. Rodríguez Cabo. It was then submitted to and approved by the "Academia Mexicana Correspondiente de la Academia Real Española" under the chairmanship of Sr. Don Martín Luis Guzmán, distinguished author, editor and publicist, also publisher of "El Tiempo."

It was then submitted to the V Pan American Highway Congress where a resolution was adopted commending the venture and recommending that the manuscript be published.

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| Murphy Diesel                           | 475.00     |
| 3 New 18.00x24 Tires, 20 Ply            | 290.00     |
| 2 New 14.00x24 Tires, 20 Ply            | 290.00     |

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3x5 Double deck vibrating screen, new, with motor and drive . . . 850

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1,000 bbl. cement storage bin, complete, new . . . 3,710

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10K Allis Chalmers Gyratory 34" x 82" . . . 11,000

Revolving Screen 35'x48" with 19'x72" sand jacket, excellent condition . . . 1,800

75 ton, 4 compartment combination cement and aggregate bin, 3 yd. batcher and scale, new . . . 4,600

With cement loader . . . 5,600

2-1949 W22 White trucks with 3 yd. Ransom mixers, hi-discharge, new 1000x20 tires, newly refinished and rebuilt, Excellent buy. Each . . . 2,800

Marion #331 heavy duty 3/4 yd. drag and clam combination, 70' of boom, 400 ft. of extra cable, Cat. diesel, extra long Cats, with swamp pads and heavy counterweight, 3/4 yd. clam digging bucket . . . 5,000

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Boilers, Hoists, Derricks, Cranes, Compressors, Railroad Equipment, Etc.

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DW10 Cat with #21 cable control and #15 scraper, serial number 1V1718, good condition — good rubber.

DW10 Cat with #21 cable control and #15 scraper, serial number 1V1734.

DW10 Cat with 150 Cummins engine, #21 cable control and extended #10 scrapers.

D8 Cat with #25 cable control and 8A dozer, serial number 2U 4942, rebuilt — new tracks.

DW10 Cat with 150 Cummins engine, #21 cable control and extended #10 scrapers.

D8 Cat with #25 cable control and 8S dozer, serial number 2U 3658, rebuilt.

D8 Cat with #25 cable control and 8A dozer, serial number 2U 9691, rebuilt — new tracks — has Johnson bar — steel plate fenders — looks like new.

D4 Caterpillar with HT-4 Traxcavator.

D6 Cat with #23 cable control and 6A dozer, serial number 8U 1860, being rebuilt.

D6 Cat with Wooldridge double drum cable control and dozer, serial number 5R 341, rebuilt engine and clutch.

35 Cat bare tractor — Fair condition, serial number 6E 723.

D4 Cat with cable end loader, serial number 7U 1669, being rebuilt.

18 Cat Ripper — Like new.

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### MOTOR GRADERS

One—late-model Austin-Western four-wheel drive, four-wheel steer, 99 Master Motor Grader, complete with new bulldozer and new scarifier; equipped with UD16 International 6-cylinder Diesel engine, new pistons and sleeve kit, new exhaust valves and new intake valves, new main bearings, new connecting rod bearings, new clutch, new throw-out bearings, pumps, transmission, transfer case, drives, all have been reworked or replaced with new. New bearings on rear and front differentials, new oil seals on front and rear differentials, starting motor and generator rebuilt, and equipped with four brand-new tires. Price .....\$10,000

If new fully-enclosed cab is wanted, complete with heater, defroster, and windshield wipers, add.....\$650

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This machine takes a 30-day guarantee.

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Two—1950 Model 150 P&H Shovels, one as a backhoe and the other as a shovel. Price, each .....\$5,000

One—1948 ¾-yd. P&H Shovel, complete with shovel attachment, in very good condition. Price for quick sale.....\$6,000

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Model 43 FDT  
Serial No. 8334 — 8241  
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Power: G. M. Diesel  
Tires: 60% — 65%

Location — Riverdale, North Dakota

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Caterpillar D-4 Tractor with 1 yard front end loader. Good condition. Inspect in our yard.  
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18 1950 and 1951 LF195 International Tandem Trucks, 450 cu. in. engines, W.B. 152" and 157", air brakes, Tires 1000 x 20 front and 900 x 20 rear.

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5 1947 K12 IHC Trucks with NHB600 Cummins engines, W.B. 180", with 2050 Gal. Fruehauf tank and 4300 gal. Fruehauf tank and Pup Trailer.

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2 1950 3-Ton Dodge Trucks with air brakes.

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1 1951 TD-14 Crawler Tractor.

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Kochring #34 E. Dual Drum Paver #19910.  
Lima #34 Paymaster Crane, Dragline #4831.  
Lorain L-50 Crane, Dragline #20440.  
Cat. #12 Grader #8T 3027.  
Cat. #12 Grader #8T 706.  
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20 x 36 UNIVERSAL PORTABLE JAW (3) Complete with Minneapolis-Moline gas engine; 24" x 31" under conveyor; mounted on steel wheels.

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(1) Same as above, less power, conveyor and mounting. Used, good condition!  
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- 1—Shovel front for P. & H. Model 855-B.
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- 33,000 sq. ft. Atlas Speed Concrete Forms. (Large number of corner sections).
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2 1/2 YD. STANDARD SHOVEL  
1953 machine — Excellent condition  
Pennsylvania location  
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- Insley "K-12" 1/2 yd. Hoe, good condition.
- Link-Belt Speeder "LS-85" 3/4 yd. Shovel, Diesel power.
- Unit "S14" 1/2 yd. Hoe, only fair.

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- Jaeger 3 yd. Hi-Discharge Moto-Mixers (4 1/4 yd. Agitators) on K811 International 6x6. Very clean and good condition — two available.
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- Jaeger 3 yd. Hi-Discharge (4 1/4 yd. Agitator), mounted Reo 6x6; low priced.
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AC Gen., W.H. 5067E264, 400 KVA, 480 V., 482 amps., 80% P.F., 3 ph., 60 cycle, 1200 RPM, Ser. No. 4959815.

W/DC exc., W.H. gen. Sty. 67E282, Ser. No. 49514, 6 1/2 KW, 125 V., 50 amps., 1200 RPM, Frame 53, w/rheostats.

Units mounted on factory cast base, in good condition, used only as stand-by unit.

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One UNIVERSAL ENGINEERING CORPORATION Model 546 Scalping Primary Unit with 4'x8' 2 deck Simplicity Screen — #248-D-803; 20x36 Jaw Crusher, S/N 115X89; 2 — 24" Side Delivery Conveyors, 30" Front Delivery Conveyor; Powered by GM Model 6031-C Diesel Engine; On 8 - 8.25x20 Pneumatic Tires; Equalizer Air Brakes.

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One Dual Tired Dolly with 5th Wheel.

Both Units Equipped With Fifth Wheel

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Standard 35 Ton Drop Deck

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Reconditioned  
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TD14A with Ateco inside mount dozer, serial No. 30762, new in 1951. Very good rails, pads and rollers. Engine and track system rebuilt. Warranted.

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Michigan Truck Crane, Model T6K w/30' boom, fairleads, tagline, shovel front, w/gas engine.  
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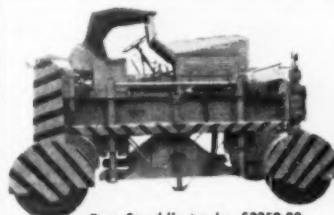
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PARSONS Mod. 205-2A, Yr. 1950, Wauk. engine, 15 ft. deep, 24" buckets w/cutters 24" to 36", 6 ft. conveyor extension. Good, sound condition. Price \$9,500.00

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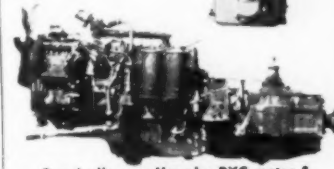
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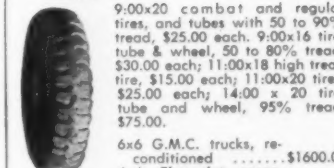
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Practically new Hercules RXC motor &amp; transmission, \$395

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Trailers, \$150.00Autocars & Federals  
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9:00x20 combat and regular tires, and tubes with 50 to 90% tread, \$25.00 each; 9:00x16 tire, tube & wheel, 50 to 80% tread, \$30.00 each; 11:00x18 high tread tire, \$15.00 each; 11:00x20 tire, \$25.00 each; 14:00 x 20 tire, tube and wheel, 95% tread, \$75.00.

6x6 G.M.C. trucks, re-conditioned .....\$1600.00  
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All Material is F.O.B. Chambersburg  
25% WITH ORDER — BALANCE C.O.D.

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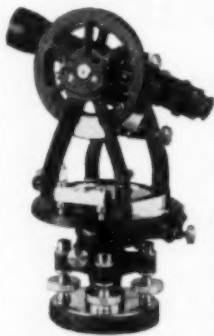
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Continental Model B427, 6 cyl., open power unit, 96 H.P. at 1600 R.P.M., Twin-Disc Clutch completely equipped, but less fuel tank. Condition BRAND NEW, SELLING AT OUR COST ..... \$916.00  
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- 2 — Cleveland Stake & Form Pullers w/solid Rubber Tired Wheels.
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- 1 — Gardner Denver Pin Driver

Location — Riverdale, North Dakota

Offered Where Is — As Is  
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Riverdale, North Dakota — Phone 633

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#### EUCLID REAR DUMP TRUCKS

Model 9W BUCYRUS-ERIE Dragline, 8 yd.  
Model 1055 P & H Shovel & drag, 3 1/2 yd.  
Model 1000 P & H Shovel, 6 yd.  
Model 54B BUCYRUS-ERIE Shovel, 2 1/2 yd.  
Model 54B BUCYRUS-ERIE Dragline, 2 1/2 yd.  
Model 38B BUCYRUS-ERIE Shovel, 1 1/2 yd.  
Model 120B BUCYRUS-ERIE Shovel & Drag, 5 yd.  
Model 170 B BUCYRUS-ERIE Shovel, 6 yd.  
Model 200B BUCYRUS-ERIE Dragline, 5 yd.  
Model S-W BUCYRUS-ERIE Dragline, 6 yd.  
Model 4500 MANITOWOC Dragline, 5 yd. & 5 yd. shovel.  
Model 4161 MARION Shovel & drag, 5 yd.  
Model 7400 MARION dragline, 9 yd.  
Model 80-D NORTHWEST shovel, 2 1/2 yd.  
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Model 3500 MANITOWOC dragline, 2 1/2 yd.  
5 yd. Dragline, excellent condition, \$33,000.00.  
CATERPILLAR GRADERS  
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excellent condition ..... \$10,500

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Model 85 ..... \$ 8,000

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### KOCH CRANE and DERRICK CO., INC.

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3 Euclid scrapers—15.5 cu. yds. struck  
7TDT-10497, 7TDT-10499, 7TDT-  
10500.  
Bros Model 450 — 50-ton rubber-tired  
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International TD-14A with hydraulic  
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Priced for immediate sale

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10,000 lb. cap., Pneumatic Tires  
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- 3—"C" Tournapulls with E-16 Scrapers.
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- 1—Super "C" Tornadozer.
- 3—E-16 Tournarocker Bodies.
- 2—E-9 Tournarocker Bodies less wheels.
- 1—C-16 Michigan Backhoe on crawlers.
- 1—P&H ¾ yd. Crane with 35' boom on crawlers.
- 1—25 Northwest ¾ yd. Crane with 30' boom on crawlers.
- 1—P&H 1 yd. Crane with 50' boom on crawlers.
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Maginnis concrete vibrator for 25 ft. width — full depth of slab with 10 vibrator units.  
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2 Universal Crushing Plants 293 QS Senior  
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Construction Equipment

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### MODEL 109 — \$600 — F.O.B. Waco

Width 9 ft. — 8 and 10 ft widths and other attachments available on special order — Adjustable spreading depth from 1/4" to 9" — Weight: 960 lbs.

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750-20 8-Ply Army Takeoffs, Perfect... \$20.95  
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All types of heavy work tires. Excellent condition.

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78 barrel 1950 and 1951 Gramm bulkers. Excellent mechanical condition. Single axle, 10 x 20 tires, air brakes. Air and gravity discharge.

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1 Upright 50HP boiler with portable dryer, hot and cold elevator with bin.

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1 TD9 International Dozer.

THE FOLLOWING EXTRA EQUIPMENT:

1 25-HP Electric motor.

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50 Ft brand new 18-in. rubber belt for conveyor.

This plant can be seen in operation on

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two — two thousand gallon tanks mounted on 1948 Federal trucks in good condition. Suitable for sprinkling or fuel oil transport.

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Caterpillar D4, D6, D7, & D8 Tractors, Caterpillar Scrapers, LeTourneau Scrapers, Bucyrus-Erie Scrapers, Heil Scrapers 6 to 25 yards, Caterpillar 12 Motor Graders, Euclid End Dumps, Hyster D4, D6, D7 Winches. Give best cash price and description in first letter.

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2—1949—3 yd. Challenge \$ 895.00  
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3 yd. Challenge on 1949 F8 Ford, 2 speed, 9:00x20 tires \$1,995.00  
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Prices quoted are F.O.B. Los Angeles, Calif.

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1—New Jeffrey Elevator, Cap. 30 Tons Hr., Speed 125 FPM.  
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2—Used I-R ES-1 Compressors w/75 H.P. Crocker Wheeler Motors — 1947.  
2—Used I-R ES-543 Motor Blowers w/40 H.P. Allis Motors — 1947.  
2—Used I-R CVS-30 Turbo Blowers w/600 H.P. G.E. & Westinghouse Motors—1948.  
1—Used Worthington Steam Turbine w/ Roots-Connorsville Centrifugal Blower — 24" Volume 15,000 CFM (Practically New).  
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1—Used G.E. 500 KW, 4160 Volt Steam Engine Generator Unit.  
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Located in Ohio, Mich., Penn. and Mass.  
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4—91 FD, 15 ton—14 mos. old  
10—46TD, 22 ton—Excellent  
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Easily mounted . . . merely lay tracks on the ground, back on and feed over tires. Clamp ends together and tighten adjusting bolts for perfect fit. Easily transferable from one vehicle to another.

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### Draglines — Cranes — Shovels

LIMA Model 604 Dragline - Crane with Cummins Diesel — Excellent.  
LIMA Type 34 "Paymaster" Dragline with Cat engine and Swamp pads. Reconditioned.  
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1—10x36 Jaw Crusher, Cedar Rapids.  
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1—1½ yd. Clamshell Bucket, Size 715-H, Blaw-Knox.  
1—4x8 Double Deck Simplicity Screen.  
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1—UD-14A International Diesel Engine.  
Large lot slightly used Austin-Western Model 99H Motor Grader Parts.  
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1—30 KW Diesel Electric Generator Set with Int. UD-14A Motor (Portable).  
1—30 KW Diesel Electric Generator Set with 3 cylinder GMC Diesel Engine (Portable).

**Contractors Equipment Co.**  
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80D N.W. Backhoe, 300 hours.  
6 N.W. Backhoe, 90% new condition.  
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4 — D8 Cat Tractors, late.  
1201 Lima Dragline Boom w/high gantry, fairleads.  
Cleveland Pioneer Diesel Trencher, #92, #95, #110, #140 Cleveland Trenchers.  
Cleveland Backfill & Tamper.  
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Northwest 25 Backhoe, S/N 16013, ¾ c.y. Capacity — G.M.C. Diesel Engine, Also, 40 ft. Northwest 25 Crane Boom.  
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Allis Chalmers Model "D" Grader, S/N 3399 with Scarifier, leaning front wheels.  
2—TS-200s Allis Chalmers Earth Movers.  
1949 G.M.C. Tractor with Saddle Tanks.  
1953 G.M.C. 6 yd. Dump Truck with 2-speed rear axle.  
The above equipment is in excellent condition and is located at Pontiac, Michigan. For full particulars, write or call:  
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1945 Quaker 5000 gallon, 3-compartment, single axle trailer, #K119, \$875.  
1946 Butler 5800 gallon 3-compartment, tandem axle, #M-233, \$2300.  
1947 Butler 5200 gallon, 3-compartment, tandem axle, #M226, \$2300.  
1948 Heil 4500 gallon, one-compartment, single axle trailer, #K139, \$1375.  
1948 Fruehauf 4430 gallon, one-compartment, single axle trailer, #K148, \$1375.  
1948 Fruehauf 5750 gallon, 3-compartment, tandem axle #M286, \$2700.  
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1950 Trailmobile 4580 gallon, one-compartment, single axle trailer, #K174, \$1675.  
1950 Heil 4600 gallon, one-compartment, single axle trailer, #K178, \$1675.  
1950 Fruehauf 7200 gallon, 3-compartment, tandem axle, #M296, \$3100.  
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1953 Butler 4150 gallon Asphalt Transport, tandem axle, #K102, \$4500.

Choice of many others.

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BUCYRUS-Erie mdl. 22B w/Cat 318 engine 30' boom sn/96269 tagline fairleads, 26" tracks. Machine has never been used.

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General Mobilecrane mdl 105 1/2 yd. 35' boom and tagline

Kochring mdl 301 3/4 yd. crane-drag comb. w/1 yd. drag bucket

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P&H mdl 255A 3/4 yd. shovel-crane-drag combination new in '55.

Northwest mdl 25 w/Cat engine. Crane-drag-hoe combination

Int. TD14 w/Hughes-Keenan swing crane and Bros blade, Tops.

#### ATTACHMENTS:

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Osgood mdl 200 shovel front, almost new condition

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1 Caterpillar D17000 diesel power unit on skids.

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1 Rosco 1000 gallon bituminous distributor.

1 Adams motor patrol.

1 Used 10x36 Cedarapids roller bearing jaw crusher.

1 Used 30x18 Cedarapids roller bearing roll crusher located at Rochester, Minn.

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All in good condition and reasonably priced.

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SIMPLICITY A550 Asphalt Plant with cold aggregate feeding unit, 8x10 double shell dryer assembly, 7' cyclone dust collection, 221 & 28 Claridge fans, revolving screen, 25 ton storage bin, manually controlled batcher, 2500# pug-mill mixer, 6031 GMC diesel, etc. Considerable quantity new parts. Excellent. \$26,500 f.o.b. cars. Rental Purchase.

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25 ton Whitcomb Diesel Locomotive 1949. 100 hp Lucy Portable Boilers 200# ASME.

140 hp Christian 2D Diesel Hoist & Swinger.

10 ton Unit #1020 Mobile Motor Crane.

25 ton Amer. Diesel Locomotive Crane.

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30 ton steel Stiffleg Derrick & Hoist.

1 1/2 yd. Manitowoc 2000B Diesel Crane 1948.

2 1/2 yd. Manitowoc 3500 Diesel Crane 1948.

3 1/2 yd. Lima 1201 Shovel-Dragline.

5 yd. P&H 1400 Diesel Shovel 1950.

2200 CFM C-P OCE Air Compr. 350 hp.

Mississippi Valley Equipment Co.

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DAS 844 Buda Diesel Engine with accessories. Almost new heads, excellent condition. \$1025.00

6DT 468 Buda Diesel Engine completely rebuilt including pump and accessories. \$1695.00

Close out prices on stock of Diamond T Truck parts including sheet metal and radiators. Write us for inventory and prices.

BILLINGS WHITE TRUCK CO.

1007 First Avenue North  
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#### COUSE TYPE-W

Mounted on 6x6 Studebaker 2 1/2 ton chassis. Hercules engine equipped with the following machinery under one roof: Couse 10 KW 3 phase 110-220-440 AC Gen. Plant plus 300 Amp. DC welder, 4 stage 35 CFM compressor, hydraulic press, acetylene generator, work tables, etc. Boom mounted over top of truck. Power winch with "A" frame (5 ton), heavy duty cables. Air hoses. Unit in new condition.

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One Chevrolet 1 1/2T. 4x4 fire truck with two booster reels, 100 GPM front mount P.T.O. pump, 350 gal. tank. Good condition.

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Tank Trailers for asphalt, water, oil. 2000 to 8500 gallon, both single and tandem axle, insulated and non-insulated; some with steam coils — some with fire tubes. Excellent trailers — priced right.

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1—605 1 1/2 yard Kochring Shovel Ser. C6075

1—K-370 GM 671 1 1/4 yard Link Belt Shovel. Ser. 2834. Cat 13000

1—25 x 40 Cedar Rapids Jaw Crusher.

1—10' x 42" Cedar Rapids Feeder.

3—Kochring Dumpsters

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A-C Model HD-10W, rebuilt and guaranteed, w/cable tipdozer and Gar Wood DDCU.

A-C Model HD-14, with new bulldozer, rebuilt and guaranteed.

A-C Model HD-5G Tractor-Shovel, rebuilt and guaranteed.

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A-C AD3 Motor Grader A-1 shape

A-C HD9 w/cable dozer

Cat. Model D-8 Tractor, good condition w/Cat. S8 bulldozer.

Used AC Model D Grader. Good condition.

Schild Bantam truck mounted dragline or Backhoe. A-1 Cond.

Cat. No. 12 Patrol — Good condition.

LaPlant Choate C-84 scraper, reasonable.

## ILLINOIS ROAD EQUIP. CO.

1310 E. Jefferson St.  
Springfield, Ill.  
Ph. 2-7709

## FOR SALE

LATE MODELS MIDWEST LOCATIONS

Manitowoc 3000-Bs, 3500s erect cranes — shovels, long booms, wide long cats diesel. Also 2000Bs

Northwest 6s, 80-Ds, & 95 cranes — drags — shovels, diesels, wide long cats — long booms. Ind BHs.

Bucyrus Erie 30-Bs, 51Bs, 54Bs, cranes—drags shovels, diesels, wide long cats — long booms

Marion, Koehring, Link Belt and Lorain models cranes — drags — shovels, wide long cats — diesels. Also backhoe equipped machines all types.

## JAMES C. FRENCH

226 Berry Pkwy. Talcott 3-4927  
PARK RIDGE, ILLINOIS

EQUIPMENT IN ALL PARTS OF THE COUNTRY APPROX. ONE MILE OF 42" BELT CONVEYER EQUIPMENT. GYRATORY: 16" & 30" Sup. McCully with motor. A-C 3-K Gates with motor. 3-K Gates. MILLS: 5x14 Marcy open end rod. 6x22 & 5x22 Allis Chalmers comp ball. 9'-6"x11' Nordberg dry ball. JAWS: 6x66 A-C with motor. 40x42 Farrel. 36x48 Farrel Bacon style B. 36x48 Diamond r.b. 25x40 Austin Western with feeder & motor. 20x36 r.b. 18x38 Austin Western with feeder & motor. ROLLS: 24x16 Telsmith. 30x22 Iowa. 40x22 Austin Western. 54x24 Pioneer. HAMMERMILLS: 42x36 Joffrey. Pennsylvania 5XR-100 and 5XC-135H. CLASSIFIERS: Derr Duplex Rake 30"x8". Derr Rake 12x30x2 1/2 type WGF Quadplex with Trommel washer on end. Hardinge Hydro-Separator 20x6. LOCOMOTIVES: 20 ton diesel std. ga. 125 ton diesel electric. 1300 cfm PRE COMPRESSOR. American R-10 REVOLVER WHIRLEY CRANE. SINGLE DRUM OTTUMWA HOISTS: 100 hp, 150 hp & 165 hp. SHOVELS & DRAGS: Manitowoc 4500, 120-B, 54-B, Marion 111-M, P&H 1055 L, 200-W. Many other items for mining, construction and quarrying. STANLEY B. TROYER EQUIPMENT CO., Box 97, Crosby, Minn. Ph. 500.

## SHOVELS — DRAGLINES DRILLS — TRACTORS TRUCKS

190-B Bucyrus Erie Electric 8 yd. Shovel

170-B Bucyrus Erie Electric 6 1/2 yd. Shovel

120-B Bucyrus Erie Electric 5 yd. Shovel

1600 P&H 6 yd. Electric Shovel

2400 Lima 6 yd. Standard Diesel Shovel

111-M Marion 4 yd. Diesel Shovel

1201 Lima 3 1/2 yd. Diesel Shovel

955 P&H 2 1/2 yd. Standard Shovel

54-B Bucyrus Erie 2 1/2 yd. Diesel Shovel

80-D Northwest 2 1/2 yd. Diesel Shovel

34 Lima Paymaster 3/4 yd. Standard Shovel

22-B Bucyrus Erie 3/4 yd. Shovel and Hoe

25 Northwest Diesel Backhoe and Crane

7-W Monighan Dragline, 185', 5 & 6 yd. buckets

625 Page Walking Dragline, 160', 9 1/2 yd. Page bucket

2400 Lima Dragline, 130' boom, 5 yd. bucket

4500 Manitowoc Dragline, 80' boom, 4 yd. bucket

1201 Lima Dragline, 85' boom, 3 yd. bucket

3500 Manitowoc Dragline, 85' boom, 2 1/2 yd. bucket

K-480 Link Belt Dragline, 75' boom, 2 yd. bucket

3500 Manitowoc Air Control Erection Crane, 120' boom

802 Lima Crawler Crane, 90' boom, 18' jib

600 Reich Heavy Hydraulic Lever Mast Rotary Drill, mounted on Ford 800 Tandem Truck

58-BH Joy Champion Diesel Rotary Drill

56-BH Middleweight Joy Rotary Air Drill

NEW 6 1/2 cu. yd. Page all manganese bucket

DW-10 Tractors, side dump Athey Wagons, 12 yd.

Model TC Woolridge Terra Cobra 15 yd. Scraper

Also 42-T, 29-T and 27-T Well Drills

## EUCLID TRUCKS Many to Choose From

## FRANK SWABB EQUIPMENT CO., INC.

313 Hazleton Nat'l. Bank Bldg.  
Hazleton, Pa. Gladstone 3-3658

## FOR SALE — EXCAVATING FIRM:

COMPLETE WITH ALL EQUIPMENT:  
Shovels, Bulldozer, Compressors, Dump trucks, Pick-Up Trucks, Field office, Tool sheds, Drill steel, Trailers, Tractors, Hand tools, Highway tool boxes, Blasting equipment, Winch trucks, Shoring lumber, Sewer pipes, Cement blocks. A complete firm ready for a buyer. Reason for selling, owner died, no one capable of managing company. Write or call:

Price \$61,475.55

## WEST END EQUIPMENT CO.

Construction & Industrial Equipment  
Keesler Street & Ziegler Avenue  
Nazareth, Pennsylvania  
Phone Nazareth 1911 between the hours of 8:00 A.M. and 5:00 P.M.—Not Sundays

## CLEARING HOUSE SECTION

## FOR SALE CONCRETE PAVING OUTFIT

Can Be Released About May 1, 1956. Also, Considerable Grading Equipment. Equipment Located Clay City, Indiana.

- 1—34E Dual Drum Koehring Paver, S/N 21621 ..... \$11,000.00
- 1—Finishing Machine Jaeger Double Scream 20 to 25 ft., S/N 42X085 ..... 3,500.00
- 1—Model 85 Apco Ser. No. 175 Concrete Widener ..... 5,000.00
- 1—Cement Bin Set up of 3 bins, conveyors, elevators, dump hopper, 1373 bbls. .... 10,000.00
- 1—Dunmore Trencher 2-6 ft. wide for 12 ft. Grader Ser. No. DW-81-35 ..... 1,700.00
- 5000 L. Ft. Heltzel 9" high, 8" base, duty road forms with pins, perfect condition, per L. Ft. .... 1.50
- 1—Cleveland Multiple blade pull type subgrader 20 to 25 ft., S/N 4X68, like new ..... 2,000.00
- 1—Jersey Material Spreader, S/N 334, like new ..... 2,000.00
- 1—Hydra Hammer on 4 pneumatic tires, S/N 625, excellent ..... 4,500.00
- 1—Cleveland Pull type Concrete Strike Off 20 to 25 ft. .... 150.00
- 3—Master electric concrete vibrators, 110-220 v., very good, each ..... 200.00
- 1—Hauck Circular Flame Water Heater ..... 300.00
- 1—Lot all necessary finishing bridges, burlap wagons, etc. (each) ..... 150.00

## Grading Equipment Can Be Released Now

- 1—Cat Pneumatic tired model DW-10 with model 10 cable scraper, S/N IV 470, excellent condition, approximately 4000 hours .... 8,500.00
- 1—Cat Pneumatic tired model DW-10 with model 10 cable scraper, S/N IV 471, excellent condition, approximately 4000 hours .... 8,500.00
- 1—RD4 Cat Tractor LeTourneau straight dozer, old but good, S/N 5231 ..... 1,500.00
- 1—D7 Cat Tractor, Push Block, S/N 7M4127, LeTourneau Power Unit (good) ..... 5,000.00
- 1—D7 Cat Tractor, push block, S/N 7M4128, LeTourneau Power Unit (good) ..... 5,000.00
- 1—D8 Cat Tractor, GarWood Power Unit, Push Plate, S/N IH61-22SP. This tractor completely rebuilt in 1955 in perfect shape. .... 7,000.00
- 1—Scraper GarWood model 525, 25 cu. yd., S/N 5231 ..... 5,500.00
- 1—Scraper GarWood model 525, 25 cu. yd., S/N 5232 ..... 5,500.00
- 1—Scraper GarWood model 528, 28 cu. yd., S/N 20377 ..... 6,000.00
- Above scrapers all good with good rubber, tires 1800 x 24 front, 1800 x 24 dual rear.
- 1—Roller, 10 Ton 3 wheel Austin Western, S/N 13434, roller good with new engine ..... 3,000.00
- 1—Roller 3 wheel Buffalo Springfield, S/N 18680 (good) ..... 2,500.00
- 1—Roller Trench Buffalo Springfield, S/N 18872A (like new) ..... 2,000.00
- 3—Rollers Double Drum sheepsfoot (good). (Each) ..... 500.00
- 1—Cat Generator Set, 25 KW ..... 2,000.00
- 1—Ripper LeTourneau heavy duty 3 tooth (good) ..... 1,200.00
- 2—Dewalt Radial Saws, electric power (good). (Each) ..... 400.00
- 2—Atkins gasoline electric power saws mounted on trailers ..... 500.00
- 1—Compressor, Gardner Denver 210 ft. on 4 steel wheels, Cat diesel, S/N 116096, good cond. .... 4,000.00
- 1—Compressor, Worthington 105 ft. on 2 pneumatic tires, S/N 158239 (good) ..... 1,800.00
- 5—Kohler Light Plants, 2 1/2 KVA from \$100.00 to ..... 300.00
- 1—Gardner Denver Wagon Drill, S/N 155126 ..... 1,000.00
- 3—Athey Cat wagons two way side dump S/N 13000 to 13058 with hydraulic pumps for D7 or D8 (each) ..... 1,000.00
- 1—Athey Cat wagon, two way side dump, S/N 13072 ..... 1,500.00
- 2—Sets New Athey Tracks, wheels and axles, set of two tracks (each set) ..... 1,000.00
- Highway Signs, 1 — 12 KVA generator sets, 2 inch and 3 inch water pumps, Jackhammers, paving breakers, etc.

## HART & HART

P. O. Box 52 — Phone 145K12  
CLAY CITY, INDIANA  
Phone 35 Ring 30 — Centerpoint, Indiana

## FOR SALE

(used)

Allis Chalmers HD-5G loader, 1950. Been through our shop.  
International TD-6 Hough Dozer-shovel, 1951. Good condition.  
Bay City Model 30 Shovel, Serial No. 2789. Will accept reasonable offer.  
Lima Model 34 Drag-shovel. GMC Diesel, 1951. Extra long and wide crawlers.

**DOW & COMPANY, INC.**  
3240 Monroe Ave. — Hillside 4080  
ROCHESTER 18, N. Y.

## FOR SALE

1—D-6 Caterpillar Bull-dozer ..... \$ 5,500.00  
1—K-360 Link Belt —  
Combination 1½ c.y.  
Shovel Front 60 ft.  
Crane Boom ..... 26,500.00  
Both in Good Condition  
Located in Pleasantville, N.J.

**Ole Hansen & Sons, Inc.**  
Pleasantville, N. J.

## Modern Sand & Gravel, Excavating, Grading Business. \$100,000 volume; net profit 20%

Will sell intact and complete  
Up-to-Date Equipment  
Excellent Pit Reserves  
Fifty Square Mile Territory  
Year Round Working Conditions  
Eighteen Years in Service.  
For complete details, write or wire:

**L. C. SMITH**  
519 S. East St. Dothan, Ala.  
Ph. 3-2500

## FOR SALE STEEL BEAMS

100 Tons 15" 142.9#x19/20'

Fabricated with four sets of 2 holes in web at approximately 4-ft. centers. Material is painted and in excellent condition. Available for inspection and immediate shipment.

**South Jersey Steel Co.**  
300 Broadway — WO 4-4092  
Camden 3, New Jersey

## FOR SALE

215 HORSE POWER G. M. Diesel Power Unit Model 6-110, Serial 6B-2437. Good Running Condition. Base, radiator, clutch P. T. O., H-D Air Cleaners, Instruments, New Muffler. \$1,975.00

**PENINSULAR DIESEL, INC.**  
Authorized G.M. Distributor  
6565 West Warren—Detroit 10, Mich.  
Phone: TYler 8-8200

## BARGAIN PRICE

American Pulverizer Crusher

Type S — Ser. No. 1362. Machine No. 42, 42"x30" top opening, V-Belt Drive, weighs 15,000 lbs., was used for Crushing and Pulverizing Bones at Glue Factory. Complete with 30 H.P., 220 Volt Motor.  
Price — \$1,750.00

**Jocelyn Iron & Steel Corp.**  
2840 S. Kedzie Ave. — Lafayette 3-7343  
CHICAGO 23, ILLINOIS

## DEPENDABLE USED MACHINES

Lima ¾ yd. Diesel dragline  
Little Giant ½ yd. Diesel hoe  
Koehring 1¼ yd. Diesel crane  
B-G No. 839 asphalt plant  
Pioneer 18V port. gravel plant  
Lessman loader, power steer  
**TRACTOR & EQUIPMENT CO.**  
10032 Southwest Hwy. Oak Lawn, Ill.

## FOR SALE — USED SEMI TRAILERS

ACID — Some Insulated.  
ASPHALT — Insulated.  
Good late models and real bargains  
Immediate Delivery

Contact Berkey or Gingerich at  
P.O. Box 591, IOWA CITY, IOWA  
Phone 8-3691, 7798 or 4719

## CLEARING HOUSE ADS BRING RESULTS

## Manufacturers' Literature

### 2-Way Radios for Ready-Mix Plant

A booklet entitled "Increased Profits for Concrete Producers through Complete Control of Ready Mixed Trucks with RCA 2-Way Radio" has been issued by the Communications Products Department of the Radio Corporation of America. Through the use of actual case histories, this 10-page brochure details the ways in which ready mixed producers are using RCA mobile radio to increase profits through greatly increased efficiency. In addition, the booklet outlines the principal features of RCA equipment specially designed to meet the requirements of the ready mixed industry. Copies of the brochure are available on request to: R. Z. LaTerza, Building 15-1, Radio Corporation of America, Camden 2, N.J.

For more information circle 153 on Service Coupon Page 16 and mail now.

### Portable Power Plants

A new 4-page folder which includes a check list to show construction men how to choose the correct portable power plant for every job has been prepared by the Master Vibrator Co., 265 Stanley Ave., Dayton, Ohio. A chart which gives

the amount of wattage needed to run various types of power tools is featured. The illustrated folder also gives specifications of the new Master generators.

For more information circle 154 on Service Coupon Page 16 and mail now.

### Test Kit for Soil Shear Strength

A new inexpensive, yet accurate technique for obtaining "in-place" shear readings of soil is featured in a 4-page bulletin (No. 700) issued by Acker Drill Co., Inc., 725 W. Lackawanna Ave., Scranton, Pa. A complete collection of vane shear test tools, suitable for testing to depths of 100 ft., is illustrated and described in the bulletin.

For more information circle 155 on Service Coupon Page 16 and mail now.

### Tractor Mounted Trencher

A new 4-page brochure on the Model 60 Everett trencher has been issued by Earth Equipment Corporation, 2036 Sacramento St., Los Angeles 21, Calif. The inside spread delineates its numerous features including generous ground clearance, right-or-left-hand dirt delivery, the up-and-down lifting system, independent hydraulic system, ability to operate within a barrier 36 in. from the center line of the trench and several unique dumping features.

For more information circle 156 on Service Coupon Page 16 and mail now.

### Trailers for Construction Industry

A new brochure, covering its complete line of trailers for the construction industry is available from the Advertising Department, Fruehauf Trailer Co., 10940 Harper Ave., Detroit 32, Mich. Covered in the brochure are latest developments in dump trailers, bulk cement handlers, platform units, pole trailers and many other types.

For more information circle 157 on Service Coupon Page 16 and mail now.

### Fuel Injection Equipment

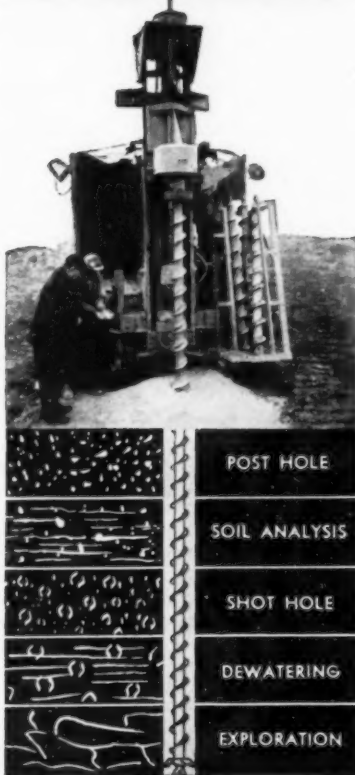
"Something Special" is the title of a new booklet (Form DE606) released by Caterpillar Tractor Co., Peoria, Ill., dealing with the manufacture of fuel injection equipment. The booklet gives an insight into the pretices used at the San Leandro plant which produces all Caterpillar fuel injection equipment, pointing out, as an example, that diamond dust is used for the final polishing.

For more information circle 158 on Service Coupon Page 16 and mail now.

### International Drott Skid Shovels

Two new colorful folders, "Versatility Unlimited" and "Four-Machine Utility," which detail operating features and advantages of the new International Drott Four-In-One skid-shovels are available for distribution. These folders fully de-

## DEEPER, FASTER McCARTHY NEW HEAVY-DUTY VERTICAL AUGER DRILLS



|                       |                      |
|-----------------------|----------------------|
| <b>AUGER DIAMETER</b> | <b>DEPTH OF BORE</b> |
| 20" and 24"           | 16' to 30'           |
| 12" and 16"           | 60' to 70'           |

for drilling in earth, clay, compacted sand and gravel, and soft shale formations.

|                               |                   |
|-------------------------------|-------------------|
| <b>3", 4½", 6", 8" and 9"</b> | <b>up to 125'</b> |
|-------------------------------|-------------------|

for drilling the above, plus drilling in hard sandstone formations.

Choose the most desired size auger for each drilling depth, in any vertical drilling operation. The new McCarthy Model 106-24 Vertical Auger Drill handles augers from 3" to 24" in diameter.

Adjust drilling speed properly for various rock and earth formations. Model 106-24 has two output shafts, one speed for earth and one for rock. A gear reducer slows auger rotation for harder rock formations. This gives more torque, or "biting power" in sand rock and soft limestone.



Write for Bulletin M-100

**THE SALEM TOOL CO.**  
794 SOUTH ELLSWORTH AVE.  
SALEM, OHIO, U. S. A.

... for more details circle 249, page 16

**ROADS AND STREETS, May, 1956**

scribe the mechanical features of the four-in-one, which is now available for International TD-6, TD-9, and TD-14 crawler tractors. Ask for forms CR-405-F and CR-406-F. Write International Harvester Co., Consumer Relations Department, 180 N. Michigan, Chicago, Ill.

For more information circle 159 on Service Coupon Page 16 and mail now.

### Blast Hole Drill

A new 32-page bulletin on its new Drillmaster 6½ in. blast hole drill, is available from Ingersoll-Rand Co. The bulletin covers three types of mountings, crawler, truck and tractor, and fully explains the revolutionary new "down the hole" drill. Two pages are devoted to very helpful rock job estimating data. The manufacturer asks that all requests be made on company letterhead and be mailed direct to Ingersoll-Rand Co., Attention: J. K. Uhler, Phillipsburg, N.J.

For more information circle 160 on Service Coupon Page 16 and mail now.

### Flourescent Ballasts

A new 20-page publication of fluorescent ballasts is available from the General Electric Co., Schenectady 5, N. Y. The 3-color bulletin, designated GEA-6249, contains descriptive information on the sound rating system, quality control, life expectancy, design features, development facilities, and customer services.

For more information circle 161 on Service Coupon Page 16 and mail now.

### Longest girder span for Connecticut expressway

With completion scheduled for November, 1957, construction has started in Connecticut on a bridge that will have the longest plate girder span in the country. The span and its approaches, totaling 3,799 feet in length, will take the Connecticut Turnpike over the Quinnipiac River. It will cost \$10,539,754.

The principal span will be 387 feet. Two similar units on either side will be 258 feet. The record girder span will be 40 feet longer than similar structures carrying the New Jersey Turnpike over the Hackensack and Passaic Rivers. D. B. Steinman, New York bridge engineer who drew the plans for the Connecticut project, said these spans are the longest of their type in the country.

Meanwhile, the original \$398,000,000 cost estimate for the Connecticut Turnpike has been revised upward by 8 per cent to \$430,000,000 by State Highway Commissioner Newman E. Argraves. The 129-mile toll highway is being constructed from the New York state line at Greenwich to the Rhode Island line at Killingly. Thus far \$200,000,000 in revenue bonds have been sold for the project.

**D-A**

**OFFERS  
YOU...  
the heavy  
equipment  
user...**

**Superior lubricants** designed specifically for your equipment *plus* D-A Personalized services including:

- 1 **24 Hour Diesel Fuel Analysis**—To determine sulphur content—distillation characteristics—and ASTM grade.
- 2 **24 Hour Used Oil Analysis**—To establish maximum safe drain periods.
- 3 **Recommendation Books**—Containing factory approved recommendations for all heavy equipment.
- 4 **Service Bulletins**—On "Up-to-the-minute" factory recommendation changes.
- 5 **Prompt on-the-job Attention**—To your lubrication problems.

*D-A Personalized Services* are available without cost or obligation. Why not talk it over with the D-A representative in your area?

...

**WRITE TODAY FOR THE NAME OF THE  
D-A REPRESENTATIVE NEAREST YOU!**



**D-A LUBRICANT  
COMPANY, INC.**  
Indianapolis 23, Indiana

**SPECIALISTS IN HEAVY-DUTY LUBRICATION SINCE 1919**  
... for more details circle 205, page 16

## With the Manufacturers and Distributors

**HARDY APPOINTED MIXERMOBILE REPRESENTATIVE.** Wayne Hardy has been appointed district representative for Mixer-Mobile Manufacturers, Portland, Ore., for 14 midwestern states. He has been with the company for 7 years. His headquarters will be the Portland office.

**CUTCRETE NAMES FROST SALES MANAGER.** D. E. Turner, President of Cutcrete Manufacturing Corporation, has announced the appointment of Hal Frost, for the past several years sales manager of the Concrete and Masonry Division of Felker Manufacturing Co., as sales manager; and, the opening of new and enlarged show room and offices at 543 South Tyler Ave., El Monte, Calif.

**NEW REX DISTRIBUTORS.** The Construction Machinery Division of Chain Belt Co., Milwaukee, Wis., has appointed the following new distributors to handle Rex Construction Machinery: Illinois Tractor Co., Mt. Vernon, Ill., and P-D Service Inc., Pavilion, N. Y., and 237 Kensington, Buffalo, N. Y.

**NEW MARION SALES TEAM.** Marion Power Shovel Co., Marion, Ohio, has announced an expanded sales organization

for the central states, headed by E. E. McCartney, Jr., newly appointed central sales manager. His headquarters are at 332 North Michigan Ave., Chicago 4, Ill. Three divisional sales managers have been named to work with him on sales and service of Marion machines in Illinois, Michigan, Wisconsin, Indiana and Kentucky. They are L. G. Currie, 4700 North Bolton Ave., Indianapolis, Ind.; W. A. Shay, 332 South Michigan Ave., Chicago, Ill.; and R. B. Falck, 28839 Floral Ave., Roseville, Mich.

**NEW DIRECTORS B-L-H CORPORATION.** Two new members have been elected to the board of directors of Baldwin-Lima-Hamilton Corporation. They are Milton Steinbach, New York City, member of Wertheim and Co., Wall Street brokerage firm, and Henry Barnhart, Lima, Ohio, vice-president in charge of the B-L-H Construction Equipment Division, with plants at Lima, Ohio, (B-L-H Lima Works), Aurora, Ill., (Austin-Western Works), Los Angeles, Calif. (Madsen Iron Works).

**TWO NEW BUCYRUS-ERIE DISTRIBUTORS.** Bucyrus-Erie Co., South Milwaukee, Wis., has appointed the following new distributors for its excavators and cranes: Contractors' Supply, 1728 Walnut St., Kansas City, Mo., for southwestern Missouri and eastern Kansas; Midland Machinery Co., Chillicothe, Mo., for

northwestern counties in Missouri bounded on the south by Buchanan, Clinton, Caldwell, Carroll, and Chariton and on the east by the counties of Macon, Adair and Schuyler. In Kansas the new distributor will handle Doniphan county only.

**CLYMER ON ROAD SHOW COMMITTEE.** Harvey A. Scribner, Chairman of the publicity committee for the 1957 ARBA road show, has announced that D. J. Clymer has been appointed a member of the publicity committee to succeed Jim Brown, who resigned recently. Mr. Clymer is with the Detroit Diesel Engine Division of General Motors Corporation.

**HALL APPOINTED BROS DISTRICT REPRESENTATIVE.** Dudley Hall has been appointed district sales representative for the west coast for Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn. Formerly assistant manager of the division, Hall will cover California, Oregon, Washington, Idaho, Nevada and the Canadian provinces of Vancouver and Alberta.

**NEW HEIL DISTRIBUTOR.** KA-MO Trailer and Equipment Co., Inc., 545-49 South Fifth St., Kansas City, Kan., has been named as the Heil body and hoist distributor for western Missouri and eastern Kansas.

**RODGERS ELECTED DIRECTOR BLAW-KNOX.** William Rodgers, sales vice-president, has been elected a director of the Blaw-Knox Co. Mr. Rodgers joined the company in 1953 in the new post of general sales manager and later in the year was elected vice-president.

**NEW WOOLDRIDGE DISTRIBUTOR.** E. H. Kliebenstein Co., Ridgefield, N. J., has been appointed distributor of the C. C. S. Wooldridge complete scraper line of Wooldridge Manufacturing Co., Sunnyvale, Calif., a division of Continental Copper & Steel Industries, Inc. The territory covers northern New Jersey and southeastern New York State.

**GIBSON APPOINTED DISTRICT SALES REPRESENTATIVE.** Howard Y. Gibson has been appointed district sales representative by Iowa Manufacturing Co., Cedar Rapids, Iowa, for its line of aggregate producing and bituminous mixing equipment. His territory will include Texas, Oklahoma, Arkansas, and Louisiana with headquarters in Dallas, Texas.

**PETZOLD JOINS BROS CO.** Herbert Petzold, Owego, N. Y., has joined the Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn., as a consultant engineer. Petzold, who has been active in soils engineering for many years, is working on the design and development of two new Bros road construction products, a self-propelled soil stabilizer and tow-type in-place material preparator.

**MARION SHIFTS SALES REPRESENTATIVES.** Marion Power Shovel Co., Marion, Ohio, has transferred several of its sales representatives as a part of its continued expansion and strengthening of its nation-wide sales organization. Walter Pierson, formerly Southeastern Area sales manager, has been transferred to the Marion home office to assume the duties of assistant to L. C. Mosley, manager of the company's Mining Division. Pierson has been with Marion for five years in various sales capacities. Hugh Lewis replaces Pierson as Southern Area sales manager. His headquarters will be at Marion's new district office and warehouse at Unit 19, Building E, 650 Murphy Ave., S. W., Atlanta, Ga. Previously, he was a divisional sales manager at Dallas, Texas for three years. William Garrison, divisional sales manager, will assist Lewis. He was transferred from a similar position which he had held in the company's area office at New York City.

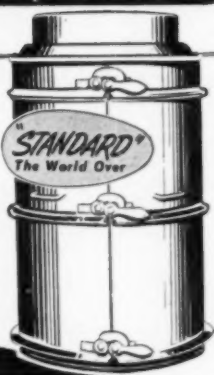
## For Quality Concrete Pipe Forms...

CALL ON **Quinn**

Backed by over 45 years of reliable service, the QUINN Heavy Duty form is recognized as the STANDARD design and the finest concrete pipe form everywhere. Used in making pipe by vibration, spading or tamping. Sizes for pipe from 10" to 120" and larger. Tongue and groove (as shown) or bell end pipe in any length desired. If your pipe orders specify extra large sizes, odd shapes or unusual lengths, there's a Quinn form made to produce the finest pipe at lowest possible cost.

Also Manufacturers of  
**QUINN CONCRETE PIPE MACHINES**  
**FREE!** Our new catalog illustrates our complete line of equipment, contains pages of valuable tips for the concrete pipe manufacturer. Write for free copy and estimates.

**Quinn WIRE & IRON WORKS**  
EAGLE, IOWA



... for more details circle 243, page 16

### CHOOSE

## 2 FINE HARRIS HOTELS

### IN NEW YORK

## HOTEL TIMES SQUARE

43rd ST. WEST OF BROADWAY  
1000 rooms with radio and Muzak from **\$350**

## KNICKERBOCKER

45th ST. EAST OF BROADWAY  
400 fine rooms with radio and Muzak from **\$4**

TELEVISION from  
**AIR-CONDITIONING**  
Other Harris Hotels

**JU-2-4200** **LA-4-6900**

CINCINNATI Metropole • Broadway • Kemper Lane

Executive Offices—  
HOTEL METROPOLE, Cincinnati, Ohio  
ALBERT HARRIS, President  
ARTHUR H. FRIEDMAN, Managing Director

DETROIT Ft. Wayne  
COLUMBUS Broad-Lincoln

**THOR EXECUTIVES TO MOVE TO CHICAGO.** Continued expansion of Thor Power Tool Co., Aurora, Ill., requires larger executive headquarters conveniently located in a major business center. Neil C. Hurley, Jr., president, said in announcing that plans have been made to move executive administration offices to the new Prudential Building, Chicago. All executive officers in the company's management and sales groups, and division managers in sales and sales promotion, will be involved in the transfer which is slated for October or November of this year. Present executive offices in the company's Aurora headquarters will be retained to maintain supervision of Thor's principal administrative departments. Administrative staffs that will continue to operate at Aurora include accounting, billing, credit and others.

**OLLENDORF NEW DISTRICT MANAGER.** D. E. Ollendorf has been appointed eastern district manager for Gar Wood Industries' Construction Equipment Division, Findley, Ohio.

**NEW BUCYRUS-ERIE DISTRIBUTOR.** Southern Gateway Co., 2200 Losantville Ave., Cincinnati, Ohio, has been appointed distributor by Bucyrus-Erie Co., South Milwaukee, Wis., for southwestern Ohio, southeastern tip of Indiana and northern point of Kentucky.

**CUMMINGS RECEIVES SERVICE AWARD.** Merle Cummings, American Sisakraft Corporation road department manager in Chicago, was presented a 15 year service award by W. M. Stevenson, President of the Corporation, at their Annual Sales Meeting in New York City, Feb. 15, 16 and 17. Cummings has been with the road department in the Chicago office since he joined the company.

**NELSON APPOINTED SALES MANAGER.** Richard S. Nelson, formerly export manager, Gates Rubber Co., Denver, Colo., has been appointed sales manager of Austin Overshot Loader Co., a division of Hercules Galion Products, Inc., Galion, Ohio.

**JACK APPOINTED REGIONAL SALES MANAGER.** Joseph E. Jack has been appointed midwest regional sales manager for Galion Allsteel Body Co., Galion, Ohio. His headquarters will be in Galion and he will supervise the sale of Galion Allsteel dump bodies, hoists and Load-elevator hydraulic end-loaders in Minnesota, Wisconsin, Illinois, Michigan, Indiana, Ohio, W. Va. and western Penn.

**TURNER PROMOTED BY IOWA MFG. CO.** Kenneth V. Turner, Dallas, Texas, district sales representative for Iowa Manufacturing Co., Cedar Rapids, Iowa, has been promoted to assistant sales manager for the Cedar Rapids line of aggregate producing and bituminous mixing equipment. His new headquarters will be at Cedar Rapids, Iowa. Mr. Turner has 18 years experience in the sales end of the construction machinery manufacturing industry which he began in 1938 with LaPlante-Choate Co., Cedar Rapids,

Iowa. In 1949 he joined the Iowa Manufacturing Company sales department.

**NEW OFFICES FOR RUBARITE.** New offices of Rubarite, Incorporated are now located at 1702 Philtower Bldg., Tulsa, Okla., according to an announcement from the firm's joint owners, the Goodyear Tire & Rubber Co., the National Lead Co., of New York, and Bird and Son, Inc., of East Walpole, Mass. Company offices formerly were located in the Board of Trade Building, Chicago, Ill. Emil R. Albert, Jr., president and general manager, and Colonel Walter F. Winters, chief engineer, will be located at the new offices in Tulsa. The firm's plant is located at Malvern, Ark.

**HYSTER ENGINEER PROMOTED.** Hugh Richmond, Hyster Co., has been promoted to the sales engineering department of Hyster's Eastern industrial truck division at Danville, Ill. Richmond has been with the engineering department at Hyster's offices in Portland for 4½ years.

**PARSONS CO. NAMES SALES REPRESENTATIVES.** John J. Harvey and Eugene H. Nelson have been appointed factory sales representatives for Parsons Co., Newton, Iowa, subsidiary of Koehring Co., Milwaukee. Harvey has been associated with Parsons Co. for more than 6 years, the majority of the time as field service engineer. Nelson joined Parsons in 1955 after doing sales and service work for an equipment firm in Utah.

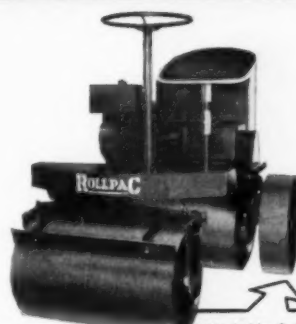
**GEN-A-MATIC NEW REPRESENTATIVE.** The Jarvis Engineering Corporation, 632 North Cicero Ave., Chicago, Ill., has been named factory representative in Indiana, Illinois and Wisconsin for the Gen-A-Matic Corp., Van Nuys, Calif.

**GADDIS PROMOTED BY HIGHWAY EQUIPMENT CO.** William Gaddis has been promoted and is now assistant general manager of Highway Equipment Co., Inc., Cedar Rapids, Iowa. He has been active in both sales and production with the company for the past 9 years. He succeeds his brother Roy Gaddis, Jr., who resigned to form his own company.

**PARTHUM APPOINTED HARNISCHFEGGER ADVERTISING MANAGER.** Charles F. Parthum has been appointed advertising and sales promotion manager of Harnischfeger Corporation, Milwaukee, Wis. Mr. Parthum was formerly with the Buchen Co., Chicago.

**NEW GARDNER-DENVER SALES MANAGERS.** William B. Knoderer has been appointed sales manager of the Industrial Division and Niel Martin Fishback has been appointed sales manager of the Mining and Construction Division of Gardner-Denver Co., Quincy, Ill.

**APPOINTED DISTRIBUTOR FOR HOBBS TRAILERS.** General Body Sales Co., 5838 N. Pulaski Road, Chicago, Ill., has been appointed distributor for Hobbs Schorrock Cable dump trailers, Fort Worth, Texas, for the city of Chicago and surrounding counties in northeastern Illinois.



Detachable Outside Edger Wheel. Rolls flush with curb or wall. Optional.

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From digging basements to building streets and grading lots, the new CAT® No. 955 Traxcavator is a bear-cat for work, a money-maker for contractors.

The machine shown here is owned by R. & M. Construction Co., St. Louis, Mo. Working on an 83-home project in the Crestwood area of St. Louis, the No. 955 is in constant use, forming subgrade for streets, digging sidewalks, backfilling foundations, spreading and grading topsoil. Mr. Howard Skinker, Master Mechanic and Grade Foreman, says: "This new No. 955 is a big improvement in tractor shovels. The increased visibility and new bucket mechanism make it a much more valuable machine."

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The boulevard has since been widened, then resurfaced completely with a hot-mix, hot-laid wearing surface of Texaco Asphaltic Concrete, spread to a compacted thickness of three inches.

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